EXHIBIT 2
TO
GENLYTE THOMAS GROUP LLC'S RESPONSE TO DEFENDANT'S STATEMENT OF UNDISPUTED FACTS AND COUNTERSTATEMENT OF FACTS

UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

GENLYTE THOMAS GROUP, LLC
Plaintiff

v.

ARCHITECTURAL LIGHTING SYSTEMS
Defendant

EXPERT DECLARATION

By

THOMAS M. LEMONS

INTRODUCTION

I have been asked by the Attorney for the Plaintiff Genlyte Thomas Group LLC ("Genlyte") to review the claims of U. S. Patent Number 5,038,254 (" '254 Patent") (Exhibit A) versus Defendant, Architectural Lighting Systems ("ALS"), Mul-T-Med MT1D (Exhibit B) and Mul-T-Med MT2 (Exhibit C) product data and related materials, as well as evaluate an actual MT2 product. This included reviewing the MT2A fixture installed in a simulated patient room to observe and photograph light patterns, determine the directional performance of these products and prepare a report detailing my factual observations and opinions including the infringement of the '254 Patent claims by the Kenall products.

QUALIFICATIONS

My Curriculum Vitae is attached hereto as Exhibit D. I am a registered professional engineer (electrical) who has practiced product and lighting installation design in the lighting field for 56 years. This experience has provided me an appreciation of the level of skills that existed in the period from 1990 through 1991. I have been granted 17 U. S. Patents as follows:

6,979,104 LED Inspection Lamp
6,177,678 Method and Apparatus for Leak Detection
5,865,527 Emergency Strobe Light
5,730,521 Glare Control Sports Lighting Luminaire

5,622,427 Emergency Strobe Light
5,485,319 Medical Device
5,390,095 Visual Signaling Device
5,313,379 Asymmetric Sports Luminaire
5,036,436 Task Light
4,864,476 Outdoor Lighting System
4,668,869 Modulated Optical Energy System
4,569,003 Interior Indirect Lighting
4,536,832 Replaceable Light Source Assembly
3,950,638 High Intensity Indirect Lighting Fixture
3,940,606 (RE 31,003) High Intensity Spotlight
3,762.083 Sky Projector
3,428,800 Spotlight Lamp

Obtaining these patents has provided me a general appreciation of the standards of patentability of inventions – namely novelty, utility and non-obviousness.

I began my career in the lighting industry by opening my own lighting business, Audio-Lite Company, when I was 16 years old. I continued to operate that business while I attended engineering school at Purdue University and sold it shortly after graduation. After receiving my B.S. in Electrical Engineering from Purdue in 1956, I was employed by Sylvania Electric Products, Inc. as a lighting applications and development engineer where I worked for 13 years until 1970. In 1970 I founded TLA-Lighting Consultants, Inc. which I still operate today. In 1979, I also co-founded ARC Sales, Inc., which I operated until I sold it at the end of 2001.

Some of my lighting design projects include navigational lighting of the Panama Canal, field lighting for Yankee Stadium and Fenway Park and product and facility design for Haworth Furniture in Holland, Michigan. I have been a member of many industry technical committees of the Illuminating Engineering Society of North America ("IESNA") as well as the International Commission on Illumination ("CIE"). This has included the Light Control and Luminaire Design Committee of the IESNA. In the CIE, I am designated as the USA expert for Division 5 which prepares standards and reports on outdoor and specialty lighting issues. I am a Fellow of the IESNA and United State Institute for Theatre Technology.

TESTIFYING EXPERIENCE IN THE PRIOR FIVE YEARS

To the best of my recollection, I have testified at trial or by deposition in the following cases in the past 5 years:

2001 – *L. S. I., Inc. v. Spaulding Lighting Corp.* Deposition @ Hunton Williams, Washington, DC

2002-3 – *Genlyte Thomas Group, LLC v. National Service Industries, Inc. et al,* District Court of the Western District of Kentucky
2004 – *Ferrel Rimer v. Regal Cinemas, Inc.* Circuit Court, Broward County, Florida
2004-5 – *Henry Boyer and Kathleen Boyer v. Fleet National Group, Inc., Tiverton Associates and John Doe,* Providence, RI Superior Court
2006 – *Sportlite, Inc. v. Genlyte Thomas Group, LLC,* District Court of Arizona
2006 – *TELE-CONS, Inc. and Michael Moisin v. Harmony Lighting, Inc et. al.* District Court of MA, (Technical Expert for Judge Lindsay)
2006 – *Kenall Manufacturing Co. v. Genlyte Thomas Group, LLC,* District Court of the Northern District of Illinois

PUBLICATIONS (10 yrs.) & COMPENSATION (to date)

The following are my published technical papers in the past 10 years:

POLARIZED LIGHTING - BASIC CONCEPTS (1995)
FACADE LIGHTING TO ENHANCE BUILDING ARCHITECTURE (1995)
OUTDOOR SPORTS LIGHTING LUMINAIRE POSITIONS (1995)
NOVEL LIGHTING INDUSTRY COATING APPLICATIONS (1995)
ELECTRONIC BALLASTS FOR HID LAMPS (1995)
MODELING FOR SPORTS LIGHTING (1999)
EXTERIOR LUMINAIRE BEAM PATTERNS (2005)

My rate of compensation paid by Genlyte for my services is $140 per hour plus expenses. To date for this case I have received a total of $5,810.00.

MATERIAL I CONSIDERED IN FORMING MY OPINION

The material that I have I considered while forming my opinion are as follows:

U. S. Patent No. 5,038,254
Mul-T-Med MT1D two page product data sheet dated 04/02 (Numbers ALS Disc 0088 & 0089) and drawing ALS0376 dated 1/03/02.
Mul-T-Med MT2A two page product data sheet dated 03/02 (Numbers ALS Disc 0086 & 0087) and drawing ALS0377 dated 6/6/01.
Sample MT2A luminaire
Photographs of MT2A light output in patient room mockup (Numbers GTG 00675 through GTG 00705)
ALS Mul-T-Med product presentation data copyrighted in 2003 (Numbers ALS Disc 0001 through ALS Disc 0023)
ALS Mul-T-Med four page brochure dated 2002 (Numbers ALS0300 through ALS 0303)
Mul-T-Med photometric test reports (Numbers GT 03556 thru GT 03570).

IESNA Lighting Handbook, 8th Edition, 1993, Definitions from Glossary
Statement of Thomas M. Lemons dated May 18, 2006
Rebuttal Statement of Thomas M. Lemons dated June 5, 2006
Drawing of a patient room that identifies fixture's vertical planes of light.
Judge Ruben Castillo Memorandum and Order dated 2/2/06 pages 19-21.
Markman Hearing Transcript before Judge Young dated June 30, 2006

LIGHT DIRECTIONALITY

The performance of light fixtures as reported in photometric test reports are provided in one or more vertical planes. These planes as illustrated in Exhibit E are perpendicular to a patient bed head wall (0° - 180° plane), parallel to the head wall (90° - 270° plane) or at a 45° angle to the head wall (45° - 225° plane). The center axis of all these planes is the vertical dot/dash center line of the illustration where 0° is straight down and 180° is straight up. The photometric test reports for the "reading", "ambient" and "examination" portions of the ALS MT2 luminaire are provided as Exhibits F, G and H. Light fixtures are generally known as down lights, up lights (or indirect lights) or some combination of down and up lighting. Since the MT2 luminaire provides no light above the horizontal, it is considered a down light. The IESNA defines the *downward component*[1] and *upward component*[2] of light from a light fixture. There is no industry definition for outwardly directed light but one skilled the art would know that a dictionary definition of *outward*[3] provides the common meaning of outwardly which I believe is consistent with its use in the '254 patent (Exhibit A). The following illustrates these directions in any particular plane:

(180°)
UP

225° 135°

(270°) **OUT** ☼ **OUT** (90°)

315° 45°

DOWN
(360°/0°)

[1] Downward component that portion of the luminous flux from a luminaire emitted at angles below the horizontal.
[2] Upward component that portion of the luminous flux from a luminaire emitted at angles above the horizontal.
[3] Toward the outside.

The following chart provides my understanding based on the industry and dictionary definitions of the conversion of photometric vertical beam angles to directional verbiage:

Angularity	Direction
0° or 360°	Down
315° to 45°	Downward
45° to 135°	Outward
90°	Out
180°	Up
135° to 225°	Upward
225° to 315°	Outward
270°	Out

The photometric reports for the ALS MT2 light fixture provide the specific performance of the three light fixtures ("reading", "ambient" and "examination") combined together into one luminaire. These reports were prepared by Genlyte at my request and direction[4]. The "reading" or first light fixture's photometric test report Number G2005043 dated 02-11-2005 is Exhibit F. The "ambient" or second light fixture's photometric test report Number G2005044 dated 02-14-2005 is Exhibit G and the "examination" or third light fixture's photometric test report Number G2005045 dated 02-14-2005 is Exhibit H. There is additional information about lighting directionality, surface reflection and "conventional troffer" ceiling mounting in my Statement dated 5/18/06 and my Rebuttal dated 6/5/06 (Exhibits I and J) which I incorporate herein by reference.

SPECIFIC LUMINAIRES

The luminaire types manufactured by ALS that I will consider in my evaluation of the Genlyte '254 patent (Exhibit A) are the ALS MT1D (Exhibit B) as well as the ALS MT2 (Exhibit C) luminaires. The ALS MT1D luminaire information is detailed on the Exhibit B data sheet. It combines a "READING" fixture and an "AMBIENT" fixture in one 2 foot by 2 foot (2x2) housing as seen in drawing Number ALS0376 (Exhibit K). The ALS MT2 luminaire information is detailed on the Exhibit C data sheet and ALS provided a sample of this luminaire which I have seen and evaluated. It combines a "READING" fixture, an "AMBIENT" fixture and an "EXAMINATION" fixture in one 2 foot by 4 foot (2x4) housing as seen in drawing Number ALS0377 (Exhibit L) which I confirm as being consistent with the ALS product provided. Further it should be noted that the ALS MT2B luminaire as identified by the Exhibit B data sheet is a luminaire with all the elements of the MT2A luminaire and the addition of a "NURSE/CHART" light. With the MT1D and the MT2A or B luminaires the "READING" fixtures

[4] These reports are in lieu of photometric reports requested from ALS that have not been provided. If provided I reserve the right to supplement this report.

are identical and their photometry is pictured identically on their data sheets (Exhibits B and C). It should be noted, however, that the "AMBIENT" fixture of the MT1D luminaire is rotated 90° from its position in the MT2A or B fixture as it is installed adjacent to the "READING" fixture in the MT1D luminaire. Despite this 90° rotation, the photometric representations for the "AMBIENT" fixture on the second page of both data sheets are identical and it suggests a wide lateral distribution. A photometric test report of the ALS MT2A "AMBIENT" fixture is contained in Exhibit G which provides the fixtures performance in the 0° and 90° vertical planes. To understand the actual performance of the ALS MT1D "AMBIENT" fixture you should use the 90° plane data and curve of Exhibit G as the 0° plane data for this fixture and the 0° plane data and curve of Exhibit G as the 90° plane data for this fixture. Though minor differences are seen in these two planes of photometric data, I would characterize both as wide beams as illustrated on page 2 of their data sheets (Exhibits B and C). On this basis, both luminaires provide outwardly directed light onto the head wall adjacent to them.

LIGHT DISTRIBUTION ILLUSTRATIONS

When evaluating an ALS MT2A luminaire sample provided by ALS, it was installed in a simulated patient room and photographs (Exhibit M) were taken at my direction. In my professional judgment, these photographs taken under my direction and control, truly and accurately demonstrate the light distribution patterns produced by the ALS MT2A luminaire installed in a patient room. To support this judgment, the photographs contained in an ALS product presentation (Exhibit N) can be compared to these photographs to see that the light patterns on the adjacent wall and across the bed appear identical.

The performance of the ALS MT2 "READING" fixture is seen in my photographs Numbers GTG 00703 and GTG 00704 from Exhibit M as well as in the ALS product presentation photograph Number ALS Disc 0023 from Exhibit N. You can see that the wall adjacent to the luminaire receives the greatest intensity of light based on its proximity to the luminaire. This is noted in an ALS Mul-T-Med four page product brochure (Exhibit O) on the second page (Number ALS0301) under the bottom central photograph of the Reading Light. This picture caption states "A combination of direct light from the fixture along with reflected from the head wall provides ample, shadow free reading light..." Specifically I call your attention to photograph Number GTG 0074 of Exhibit M where the reading material casts a shadow produced by the direct light but the reflected light provides light into this shadow eliminating what would otherwise be a black shadow. A wide lateral distribution is also apparent from the photographs. The light distribution curves of the photometric test report for the MT2A "READING" fixture (Exhibit F) provides the specific light distribution in the vertical planes that produces the results contained in the photographs.

The performance of the ALS MT2A "AMBIENT" fixture is seen in photographs Numbers GTG 00676 and GTG 00677 from Exhibit M as well as in the ALS

product presentation photograph Number ALS Disc 0019 from Exhibit N. You can see the wide spread of light onto the head wall where it will reflect back onto the bed to supplement the direct light down from the fixture. This achieves the "soft glare-free general illumination" identified in the caption of the Mul-T-Med product brochure in the caption under the bottom left Ambient Light picture on page Number ALS0301 of Exhibit O. The light distribution curves of the photometric test report for the MT2A "AMBIENT" fixture (Exhibit G) provides the specific light distribution in the vertical planes that produces the results contained in the photographs. Also please note that photograph Numbers GTG 00678 and ALS Disc 0019 show the light directed onto a side wall from the MT2 "AMBIENT" fixture and this side wall illumination becomes the head wall illumination for the MT1D fixture.

The performance of the ALS MT2 "EXAMINATION" fixture is seen in photograph Numbers GTG 00697 and GTG 00698 from Exhibit M. You can see that the lateral distribution of light on the head wall is much less than the lateral distribution of light as pictured on the head wall from the "ambient" fixture. The light directed onto the head wall is seen to start close to the top of the wall which identifies that in the vertical plane perpendicular to the wall the fixture produces a very wide distribution. The light distribution curves of the photometric test report for the MT2 "EXAMINATION" fixture (Exhibit H) provides the specific light distribution in the vertical planes that produces the results contained in the photographs.

ELEMENTS OF CLAIMS

I am providing the following information about the elements of the '254 patent (Exhibit A) based on my statement dated May 18, 2006 (Exhibit I) as supported by my rebuttal statement dated June 5, 2006 (Exhibit J). My Claim modifications are noted in **blue** and alternate claim modifications based on Judge Castillo's order (Exhibit P) as requested in the Markman Hearing Transcript (Exhibit Q) are noted in red in the following:

Claim 1

A medical lighting system comprising:

a) a body;

b) **installed on or in a ceiling;**

c) a first light fixture within said body…

1) **set or arranged**

2) to direct[5] **illumination below the luminaire to a zone where a patient reads material;**

[5] The Transcript (Exhibit Q) identifies on page 8 starting at line 20 that the Court believes "to direct" is equivalent "to aim". In my Rebuttal report, item 7 (Exhibit J) I take exception to using language that says "to direct" is equivalent "to aim". i.e. You aim a flashlight or a spotlight but you can only "direct" a wide beam of light such as the beams from the three fixture of the '254 patent.

2) to direct more light in a downward direction than in an upward or outward direction to a zone where a patient reads material;

d) a second light fixture within said body…

a. set or arranged…

b. to direct illumination in a direction below and away from center to a vertical wall surface outwardly adjacent from said body…

b. to direct more light in a downward and outward direction than in an upward direction to a vertical wall surface next to or near either end of said body…

c. whereby light is redirected by the surface to an area of the bed and around the bed under said body.

Claim 2

The medical lighting system of claim 1 wherein…

a. said first light fixture includes…

1) a first device used to redirect flux from a source by the process of reflection and…

2) a first fluorescent bulb there within; and…

b. said second light fixture includes…

1) a second device used to redirect flux from a source by the process of reflection and…

2) a second fluorescent bulb there within.

Claim 3

A medical lighting system comprising:

a. a body;

b. installed on or in a ceiling;

c. a first light fixture within said body…

1) set or arranged…

2) *to direct* illumination *below the luminaire to a zone where a patient* reads material;

2) to direct more light in a downward direction than in an upward or outward direction to a zone where a patient reads material:

d. a second light fixture within said body…

1) set or arranged…

2) to direct illumination in a direction below and away from center to a vertical wall surface outwardly adjacent from said body;

2) to direct more light in a downward and outward direction than in an upward direction to a vertical wall surface next to or near either end of said body…

e. a third light fixture within said body…

1) *set or arranged*

2) to direct **illumination below the luminaire** to an area of the **patient's bed used for examination.**

2) to direct more light in a downward direction than in an upward or outward direction to an area of the patient's bed used for examination.

Claim 4

The medical lighting system of claim 3 wherein…

a. said first light fixture includes…

1) a first **device used to redirect flux from a source by the process of reflection** and…

2) a first fluorescent bulb there within;

b. said second light fixture includes…

1) a second **device used to redirect flux from a source by the process of reflection** and…

2) a second fluorescent bulb there within: and…

c. said third light fixture includes…

1) a third **device used to redirect flux from a source by the process of reflection** and…

2) a **unit of lamps and sockets** there within.

Claim 5

The medical lighting system of claim 4 wherein…

a. said **unit of lamps and sockets** includes…

1) at least one fluorescent bulb with…

2) a **three dimensional array of flux emitted by a lamp**…

3) oriented in a direction perpendicular to said at least one fluorescent bulb.

Claim 6

The medical lighting system of claim 5 wherein said at least one fluorescent bulb is a "biax"-type bulb.

Claim 7

The medical lighting system of claim 5 wherein…

a. said **unit of lamps and sockets** includes…

1) at least two fluorescent bulbs with…

2) a **unit of lamps and sockets** …

3) oriented in a direction perpendicular to said at least two fluorescent bulbs.

Claim 8

The medical light of claim 7 wherein said at least two fluorescent bulbs are "biax"-type bulbs.

Claim 13

The medical lighting system of claims 3 wherein a distribution of light from said first and second light fixtures excludes **the sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted to cause annoyance, discomfort or loss in visual performance and visibility** from being directed to a forward area of a standard hospital bed placed below the medical lighting system.

Claim 14

The medical lighting system of claims 3 wherein a distribution of light from said first and second light fixtures excludes **the sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted to cause annoyance, discomfort or loss in visual performance and visibility** from areas adjacent to a standard hospital bed placed below the medical lighting system.

ELEMENTS FOUND IN ALS PRODUCTS

The following are the elements that I have found based on my claim interpretation versus alternate elements I find for the alternate claim interpretations noted in red for the interpretation made by Judge Castillo (Exhibit P)[6].

Claim 1

A medical lighting fixture comprising…

a. a body...The ALS Drawing ALS0376 (Exhibit K) in the upper left corner states 23 ¾" square housing and the ALS Drawing ALS0377 (Exhibit L) in the upper left states 23 ¾" x 47 ¾" housing and these "housings" are the luminaire's body.

b. installed in or on a ceiling; The ALS Mul-T-Med brochure on page ALS0303 of Exhibit O under mounting of the MT1 or MT2 luminaire states "1 grid ceiling mount (standard)" which is recessed mounting as well as "2 surface mount kit". Please Note: The MT1 and MT2 luminaires have a face lip or flange around the luminaire as seen in the upper left CROSS SECTION of ALS0376 and ALS0377 drawings and more clearly in the ALS0377 upper center PRISMATIC SECTION drawing which provide the mounting of a "conventional troffer" into a grid ceiling as pictured in these drawings and disclosed in the '254 patent.

c. a first light fixture within said body…

1) set or arranged...The ALS Drawing ALS0376 (Exhibit K) for the MT1D luminaire and the ALS Drawing ALS0377 (Exhibit L) illustrates the "READING" fixture mounted at one end of the luminaire in the lower left REFLECTED PLAN illustration.

2) to direct illumination below the luminaire to a zone where a patient reads material; The ALS Multi-T-Med brochure (Exhibit O) on page

[6] I understand that Judge Castillo's claim interpretation order has been vacated and ordered depublished.

ALS0301 "Reading Light" picture has a caption which states "A combination of direct and reflected light from the fixture along with reflection from the head wall provides ample, shadow-free reading light – even when the bed is fully elevated."

2) to direct more light in a downward direction than in an upward or outward direction to a zone where a patient reads material; The ALS "READING" fixture photometric test report Number G2005043 (Exhibit F) on page GT 03568 has a Zonal Lumen Summary Table of lumens in 5° increments. I add the lumens from 0° through 45° and obtain 770 lumens which is 56.2% of the total and there are zero lumens in the 90° to 180° zone (upward). Therefore there is more light directed downwardly than there is light directed outwardly or upwardly.

d. A second light fixture within said body...

1) set or arranged The ALS Drawing ALS0376 (Exhibit K) illustrates the MT1D "AMBIENT" fixture located adjacent to the "READING" fixture in the upper left cross section illustration and in the ALS Drawing ALS0377 (Exhibit L) shows the MT2 "AMBIENT" fixture located at the center of the outter end of the luminaire in the REFLECTED PLAN.

*2) to direct illumination below and away from center to a vertical wall surface outwardly adjacent from said body..,*The photographs Numbers GTG 00676 and 00677 of Exhibit M and Number ALS Disc 0019 of Exhibit N as well as the Ambient Light illustration of Exhibit O page ALS0301 all show the illumination on the head wall and the caption of the brochure Ambient Light Picture (ALS0301) states "Provides soft glare-free general illumination..." This glare-free illumination comes from light that is directed below and away from the fixture onto the head wall. Without the reflection of light off the wall which raises the eye adaptation, the bright luminaire in a dark environment would produce glare.

*2) to direct more light in a downward and outward direction than in an upward direction...*The ALS "AMBIENT" fixture photometric test report Number G2005044 (Exhibit G) on page GT 03561 in the Zonal Lumen Summary Table at the middle of the page shows 100% of the lumens (light output) in the 0° to 90° zone (downward and outward) and zero lumens in the 90° to 180° zone (upward)

3) whereby light is redirected by the surface to an area of the bed and around the bed under said body. By the laws of physics, the light reflection from the wall will be directed downward and outward from the wall and therefore back under the luminaire.

Claim 2

The medical lighting system of claim 1 wherein...

a. said first light fixture includes...

*1) a first device used to redirect flux from a source by the process of reflection and...*The ALS0376 drawing (Exhibit K) and ALS0377 drawing (Exhibit L) under the Specification heading at item 2 states "Reflectors to be painted white." As seen in the upper left CROSS SECTION of drawing

ALS0376 for the READING light, the curved metal above the lamp is the reflector.

2) a first fluorescent bulb there within; and...The ALS0376 drawing (Exhibit K) and ALS0377 (Exhibit L) under the Specification heading at item 1 states "- Reading (1) F39 Biax lamp" which is a fluorescent lamp.

b. said second light fixture includes...

1) a second device used to redirect flux from a source by the process of reflection and...The ALS0376 drawing (Exhibit K) and ALS0377 drawing (Exhibit L) under the Specification heading at item 2 states "Reflectors to be painted white." As seen in the upper left CROSS SECTION of drawing ALS0376 for the AMBIENT light, the curved metal above the lamp is the reflector.

2) a second fluorescent bulb there within. The ALS0376 drawing (Exhibit K) and ALS0377 drawing (Exhibit L) under the Specification heading at item 1 states "Ambient light (2) F39 Biax lamps" which are fluorescent lamps.

Claim **3**

A medical lighting fixture comprising...

a. a body... The ALS Drawing ALS0377 (Exhibit L) in the upper left corner states "23 ¾" x 47 ¾" housing" which the next line relates to a 24" x 48" grid which identifies a 2' x 4' housing which is the body.

b. installed on or in a ceiling; The ALS Mul-T-Med brochure on page ALS0303 of Exhibit O under mounting of the MT2 luminaire states "1 grid ceiling mount (standard)" which is recessed mounting as well as "2 surface mount kit".

c. a first light fixture within said body...

1) set or arranged...The ALS0377 drawing (Exhibit L) in the Section A-A drawing illustrates the "READING" fixture mounted at the left hand end of the luminaire and in the ALS Mul-T-Med brochure on page ALS0301 (Exhibit O) the "READING" fixture is located adjacent to the head wall.

2) to direct illumination below the luminaire to a zone where a patient reads. The ALS Multi-T-Med brochure (Exhibit O) on page ALS0301 "Reading Light" picture has a caption which states "A combination of direct and reflected light from the fixture along with reflection from the head wall provides ample, shadow-free reading light – even when the bed is fully elevated."

2) to direct more light in a downward direction than in an upward or outward direction to a zone where a patient reads material; The ALS "READING" fixture photometric test report Number G2005043 (Exhibit F) on page GT 03568 has a Zonal Lumen Summary Table of lumens in 5° increments. I add the lumens from 0° through 45° and obtain 770 lumens which is 56.2% of the total and there are zero lumens in the 90° to 180° zone (upward). Therefore there is more light directed downwardly than there is light directed outwardly or upwardly.

d. A second light fixture within said body...

1) set or arranged...The ALS0377 drawing (Exhibit L) in the "REFLECTED PLAN" and the "CROSS SECTION" illustrations locate the "AMBIENT" fixture at the right end of the luminaire between the outer rows of "EXAMINATION" fixtures.

2) to direct illumination in a direction below and away from center to a vertical wall surface outwardly adjacent from said body; The photographs Numbers GTG 00676 and 00677 of Exhibit M and Number ALS Disc 0019 of Exhibit N as well as the Ambient Light illustration of Exhibit O page ALS0301 all show the illumination on the head wall and the caption of the brochure Ambient Light Picture (ALS0301) states "Provides soft glare-free general illumination..." This glare-free illumination comes from light that is directed below and away from the fixture onto the head wall. Without the reflection of light off the wall which raises the eye adaptation, the bright luminaire in a dark environment would produce glare

2) to direct more light in a downward and outward direction than in an upward direction...The ALS "AMBIENT" fixture photometric test report Number G2005044 (Exhibit G) on page GT 03561 in the Zonal Lumen Summary Table at the middle of the page shows 100% of the lumens (light output) in the 0° to 90° zone (downward and outward) and zero lumens in the 90° to 180° zone (upward)

3) whereby light is reflected back to a broad area under said body. By the laws of physics, the light reflection from the wall will be directed downward and outward from the wall and therefore back under the luminaire onto the hospital bed.

e. a third light fixture within said body...

1) set or arranged... The ALS0377 drawing (Exhibit L) in the "REFLECTED PLAN" and the "CROSS SECTION" illustrations locate the "EXAMINATION" fixtures in two parts at either side of the luminaire starting behind the "READING" light.

2) to direct illumination below the luminaire to an area of the patient's bed used for examination. The GTG 00697 and GTG 00698 photographs of Exhibit M illustrates how the light is directed down onto the bed and not in a wide distribution across the head wall.

2) to direct more light in a downward direction than in an upward or outward direction to an area of the patient's bed used for examination. The ALS "EXAMINATION" fixture photometric test report Number G2005045 (Exhibit H) on page GT 03558 has a Zonal Lumen Summary Table of lumens in 5° increments. I add the lumens from 0° through 45° (downward) and obtain 1968 lumens which is 68.6% and there are zero lumens in the 90° to 180° zone (upward). Therefore there are more lumens directed downward to the location where the patient will be examined than outward and upward.

Claim 4

The medical lighting system of claim 3 wherein...

a. a first light fixture includes...

1) a first device used to redirect flux from a source by the process of reflection and...ALS drawing ALS0377 (Exhibit L) illustrates in SECTION A-A the curved metal formed up over the lamp which the SPECIFICATION identify as item 2 "Reflector painted white"

2) a first fluorescent bulb there within; ALS drawing ALS0377 pictures in SECTION A-A an end view of the F39 Biax lamp identified in the SPECIFICATIONS item 1. A Biax lamp is a fluorescent lamp.

b. said second light fixture includes...

1) a second device used to redirect flux from a source by the process of reflection and...ALS drawing ALS0377 (Exhibit L) illustrates in the CROSS SECTION at the upper left the curved metal above lamps placed on each side of the curved metal and the SPECIFICATIONS item 2 states "Reflectors painted white"

2) a second fluorescent bulb there within; and... As noted above, there are two F39 Biax lamps mounted on the curved reflector as confirmed by the SPECIFICATIONS item 1 which states "Ambient light (2) F39 Biax lamps" and a Biax lamp is a fluorescent lamp.

c. said third light fixture includes...

1) a third device used to redirect flux from a source by the process of reflection and... The two part "EXAMINATION" fixture is shown in ALS drawing ALS0377 (Exhibit L) in the upper left CROSS SECTION and the REFLECTED PLAN. In the CROSS SECTION the lamps are mounted to a metal part which angle up, across and down the opposite side from the lamp to form a reflector housing around the lamps. As noted in the SPECIFICATIONS item 2 "Reflectors to be painted white".

2) a unit of lamps and sockets there within. ALS drawing ALS0377 (Exhibit L) illustrates in the REFLECTED PLAN the four Biax lamps and their sockets mounted onto the reflector above them as seen in the CROSS SECTION.

Claim **5**

The medical lighting system of claim **4** *wherein...*

a. said unit of lamps and sockets includes...

1) at least one fluorescent bulb with...ALS drawing ALS0377 (Exhibit L) in the REFLECTED PLAN all Biax lamps are pictured and the unit of lamps and sockets for the "EXAMINATION" fixture has two segments where two lamps are mounted into sockets attached to a reflector as seen on the upper left CROSS SECTION.

2) a three dimensional array of flux emitted by a lamp...The light distribution pattern of the "EXAMINATION" fixture is provided in the GTI Testing Laboratory Report Number G2005045 (Exhibit H) as seen in the lower right 3 plane curves on page GT 03556.

3) oriented in a direction perpendicular to said at least one fluorescent bulb. The maximum intensity of light as seen by the G2005045 test report (Exhibit H) is at 0° in all three vertical planes which makes the orientation perpendicular to the lamps.

Claim 6

The medical lighting system of claim 4 wherein said at least one fluorescent bulb is a "biax"-type bulb. As identified in ALS drawing ALS0377 (Exhibit L) in both the REFLECTED PLAN and SPECIFICATIONS, all lamps are the "Biax" type.

Claim 7

The medical lighting system of claim 5 wherein...

a. said unit of lamps and sockets includes...

*1) at least two fluorescent bulbs with...*As previously noted, the "EXAMINATION" fixture as pictured in ALS drawing ALS0377 (Exhibit L) REFLECTED PLAN has two parts and each part has two Biax lamps.

2) a light distribution pattern... The light distribution pattern of the "EXAMINATION" fixture is provided by two lamps in the GTI Testing Laboratory Report Number G2005045 (Exhibit H) and as seen in the lower right 3 plane curves on page GT 03556.

3) oriented in a direction perpendicular to said at least two fluorescent bulbs. The maximum intensity of light as seen by the G2005045 test report (Exhibit H) is at 0° in all three vertical planes which makes the orientation perpendicular to the lamps.

Claim 8

The medical light of claim 7 wherein said at least two fluorescent bulbs are "biax"-type bulbs. As identified in ALS drawing ALS0377 (Exhibit L) in both the REFLECTED PLAN and SPECIFICATIONS, the two lamps of each of the "EXIMINATION" fixture's two parts are the "Biax" type.

Claim 13

The medical lighting system of claims 3 wherein a distribution of light from said first and second light fixtures excludes the sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted to cause annoyance, discomfort or loss in visual performance and visibility from being directed to a forward area of a standard hospital bed placed below the medical lighting system. The ALS Mul-T-Med brochure (Exhibit O) on page ALS0301 in the captions of the "Reading Light" and "Ambient Light" state "combination of direct light from the fixture along with reflected light from the head wall provides ample, shadow-free reading light..." and "Provides soft glare-free general illumination while shielding any view of the lamps from either the staff, visitor or patient's perspective." I believe this second quote made for the Ambient Light also applies for the Reading Light unless the patient is lying flat and looking directly up into it when it would not be used. On this basis, the first and second fixtures of the ALS MT2 luminaire are glare-free.

Claim 14

The medical lighting system of claims 3 wherein a distribution of light from said first and second light fixtures excludes the sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted to cause annoyance, discomfort or loss in visual performance and visibility from areas adjacent to a standard hospital bed placed below the medical lighting system. The ALS Mul-T-Med brochure (Exhibit Q) on page ALS0301 in the captions of the "Reading Light" and "Ambient Light" state "combination of direct light from the fixture along with reflected light from the head wall provides ample, shadow-free reading light..." and "Provides soft glare-free general illumination while shielding any view of the lamps from either the staff, visitor or patient's perspective." I believe this second quote made for the Ambient Light also applies for the Reading Light unless the patient is lying flat and looking directly up into it when it would not be used. On this basis, the first and second fixtures of the ALS MT2 luminaire are glare-free.

CONCLUSION

Based on the foregoing, I conclude that the ALS MT1D product contains structure that is identical or equivalent to each and every element and limitation recited in, and therefore infringes, Claims 1 and 2 of U.S. Patent No. 5,038,254 and the ALS MT2 product contains structure that is identical or equivalent to each and every element and limitation recited in, and therefore infringes, Claims 1 through 8 and Claims 13 and 14 of U.S. Patent No. 5,038,254.

I declare under the pains and penalties of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Executed this 27 day of October, 2006.

Thomas M. Lemons
TLA-Lighting Consultants, Inc.
7 Pond Street, Salem MA)1970

EXHIBIT A
TO EXPERT DECLARATION
OF THOMAS M. LEMONS

United States Patent [19]

Fabbri et al.

[11] **Patent Number: 5,038,254**

[45] **Date of Patent: Aug. 6, 1991**

[54] **INTEGRATED MEDICAL LIGHT SYSTEM**

[75] Inventors: **William C. Fabbri**, Billerica; **Roy Crane**, Wilmington, both of Mass.

[73] Assignee: **Keene Corporation**, Union, N.J.

[21] Appl. No.: **629,436**

[22] Filed: **Dec. 18, 1990**

[51] **Int. Cl.**[5] **F21V 13/00**

[52] **U.S. Cl.** **362/33**; 362/225; 362/147; 362/804

[58] **Field of Search** 362/33, 225, 240, 364, 362/147, 804

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,928,757 12/1975 Nelson ..... 362/804 X

4,204,274 5/1980 Lüderitz ..... 362/225 X

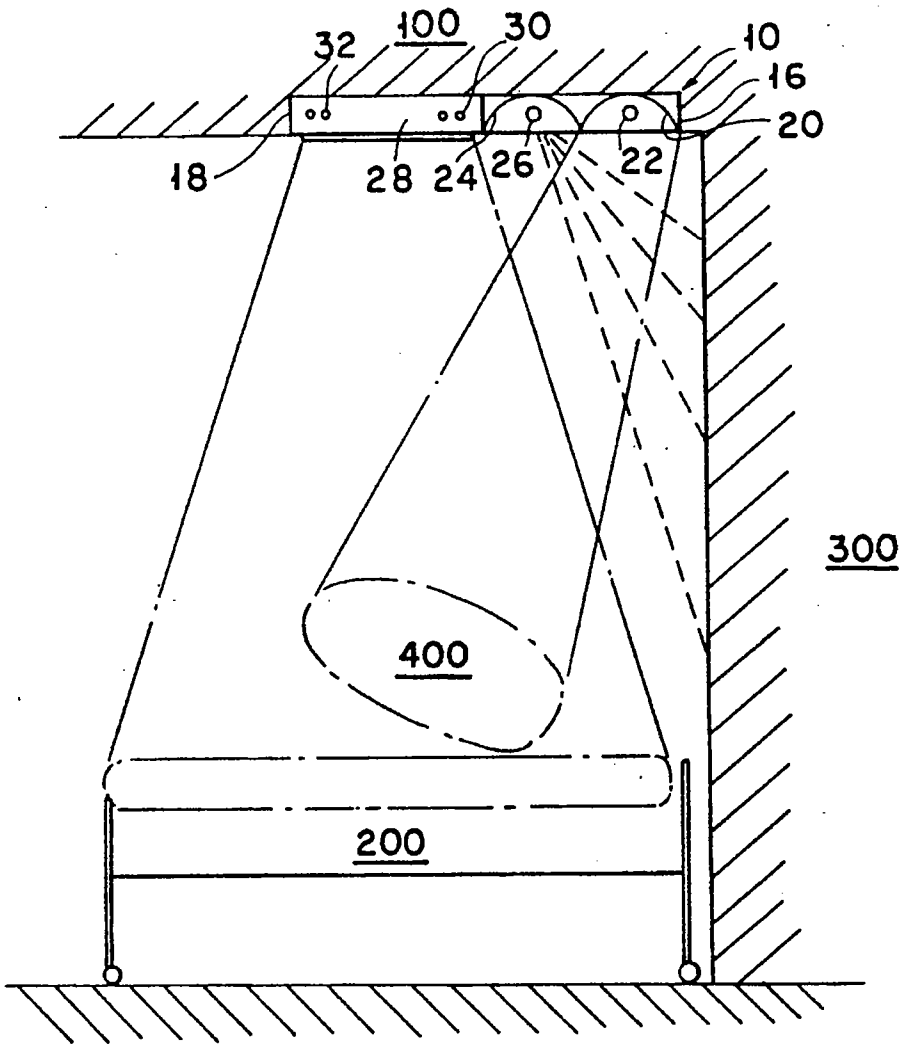
Primary Examiner—Stephen F. Husar

Attorney, Agent, or Firm—Kane, Dalsimer, Sullivan, Kurucz, Levy, Eisele and Richard

[57] **ABSTRACT**

The apparatus is a medical lighting system which includes a ceiling-mount reading light, examination light and ambient light. The reading light is directed toward a selected reading area on a hospital bed directly below the medical lighting system. The examination light illluminates the entire top surface of the hospital bed. The ambient light directs light to a wall abutting the head of the hospital bed thereby providing reflected light to the vicinity of the hospital bed.

14 Claims, 2 Drawing Sheets



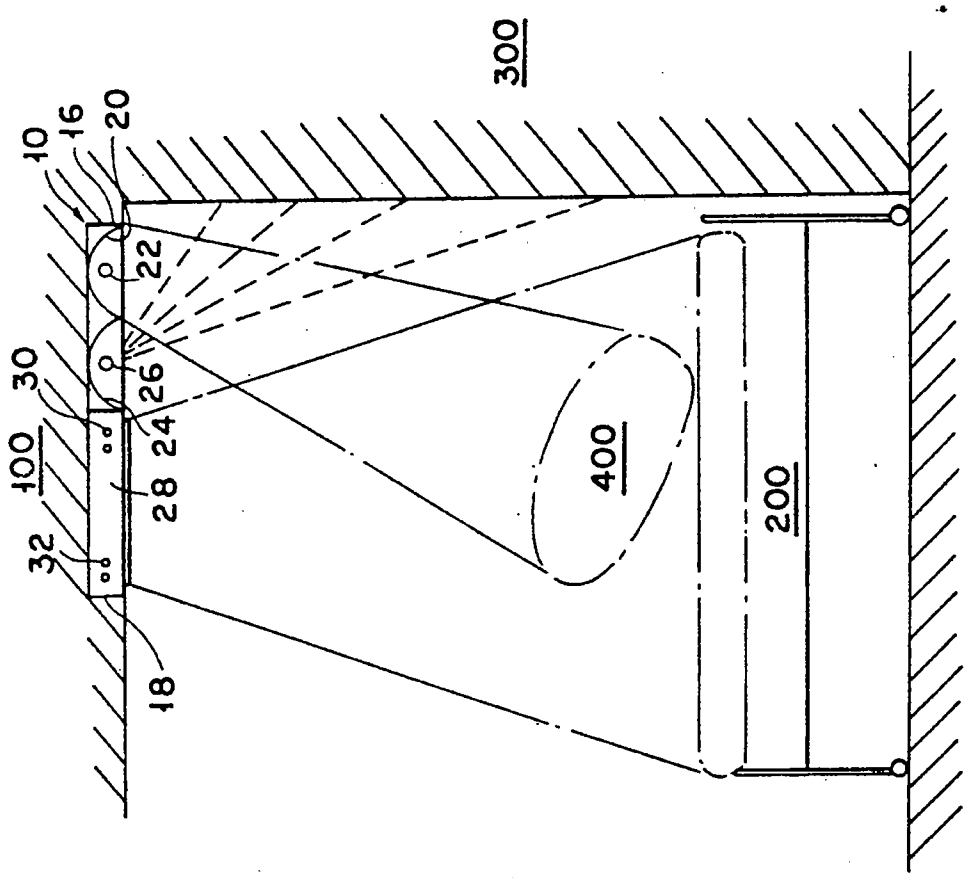


FIG. 1

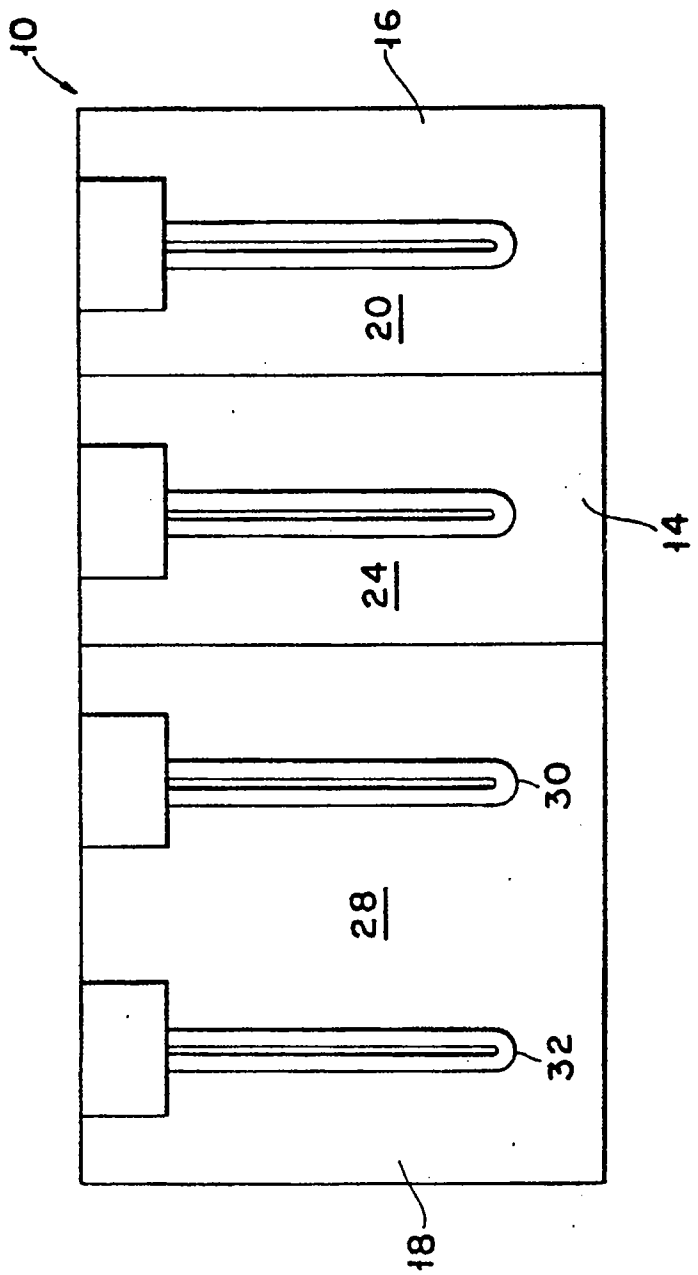


FIG. 2

INTEGRATED MEDICAL LIGHT SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention pertains to a light system for use in hospitals and health facilities. The light system includes an examination light, an ambient light, and a reading light and is preferably mounted in the ceiling.

2. Description of the Prior Art

In hospitals and similar health or medical facilities, it is desirable to provide the bedridden patient with three types of lights—the first is an ambient light which provides background, preferably reflected, light to a large area surrounding the bed; the second is a reading light which provides direct light to a portion of the patient's bed; and the third is an examination light which directs a high intensity light to substantially the entire area of the patient's bed. The ambient light typically has an illumination value of approximately 50 foot-candles while the reading light typically has an illumination value of approximately 70 foot-candles and the examination light typically has an illumination value of approximately 100 foot-candles.

In the prior art, these lights were typically provided individually in a haphazard way. Different types of lamps and light fixtures were placed around the bed with numerous plugs competing with medical equipment for available outlet space. Moreover, such an arrangement was unsightly and could impede the mobility of the patient, the patient's bed, or the surrounding medical equipment.

Wall-mounted fixtures alleviated some of the above-identified deficiencies but still left much to be desired aesthetically and, more importantly, could impede access to the patient, and were easily damaged by motor driven bed headboards.

OBJECTS AND SUMMARY OF THE INVENTION

It is therefore an object of this invention to provide an integrated medical lighting system which provides an ambient light with an illumination value of about 50 foot-candles over a wide area; a reading light with an illumination value of about 70 foot-candles over an area appropriate for a patient reading in bed; and an examination light with an illumination value of about 100 foot-candles over the entire area of the patient's bed.

It is therefore a further object of this invention to provide an integrated medical lighting system which requires no more than one or two electrical connections.

It is therefore a still further object of this invention to provide an integrated medical lighting system which does not impede access to the patient, the patient's bed, or surrounding medical equipment.

It is therefore a final object of this invention to provide an integrated medical lighting system which is aesthetically pleasing.

These and other objects are effectively attained by providing a ceiling-mounted medical lighting system which includes three individual dedicated light fixtures. The lighting system is rectangular and is designed to be placed so that one of the shorter ends of the rectangle is placed substantially on the ceiling-wall interface directly over the head of the patient's bed. The bed is placed so that the longer sides of the bed are parallel to the longer sides of the rectangular light fixture.

A first light fixture includes a fluorescent bulb and a reflector designed to direct light toward the forward portion of the patient's bed so as to allow a patient to read comfortably. A second light fixture includes a fluorescent bulb and a reflector designed to direct light toward a vertical wall abutting the head of the patient's bed so as to provide a reflected light over a large area around the patient's bed. A third light fixture includes two to four fluorescent (preferably biax® or other U-shaped) bulbs which are oriented perpendicularly to the bed. The fluorescent bulbs have a light distribution pattern which is substantially oriented in the direction perpendicular to the bulb. Therefore, the entire area of the bed is efficiently illuminated providing an examination light.

BRIEF DESCRIPTION OF THE DRAWINGS

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIG. **1** is a side plan view of the integrated medical light system of the present invention.

FIG. **2** is a bottom plan view of the integrated medical light system of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in detail wherein like numerals indicate like elements throughout the several views, FIG. **1** is a side plan view of lighting fixture **10** shown installed in ceiling **100** directly over bed **200**. FIG. **2** shows the rectangular shape of lighting fixture **10** formed by long sides **12, 14** and short sides **16, 18**. Long sides **12, 14** are typically four feet in length while short sides **16, 18** are typically two feet in length. As shown in FIG. **1**, short side **16** abuts the wall-ceiling (**300, 100**, respectively) interface directly over the head of bed **200**. Long sides **12, 14** are parallel to the longer side of bed **200**.

Reading light reflector **20** is along short side **16** of lighting fixture **10** proximate to wall **300** and includes a fluorescent bulb **22** positioned therewithin parallel to short sides **16, 18** of lighting fixture **10** so as to provide a direct light to reading area **400** of bed **200** as shown on FIG. **1**. Reflector **20** and bulb **22** are chosen to provide an illumination of approximately 70 foot-candles to reading are **400**.

Ambient light reflector **24** is inwardly adjacent to reading light reflector **20** and includes a fluorescent bulb **26** positioned therewithin parallel to short sides **16, 18** of lighting fixture **10** so as to reflect or bounce light from wall **300** thereby providing ambient light to bed **200**. Reflector **24** and bulb **26** are chosen to provide approximately 50 foot-candles of illumination to the ambient area.

Reflectors **20, 24** and bulbs **22, 26** are configured so as not to direct glare toward the head of bed **200** where the patient's head is likely to be, whether in a supine or sitting position. Similarly, reflectors **20, 24** and bulbs **22, 26** are configured so as not to direct glare to areas adjacent to bed **200** so as to allow other beds (not shown) to be placed proximate thereto without undue disturbance of neighboring patients.

Examination light reflector **28** is outwardly adjacent to ambient light reflector **24**, includes short side **18** and is opposite from reading light reflector **20**. Examination

light reflector **28** includes two to four fluorescent bulbs **30, 32**. Fluorescent bulbs **30, 32** (preferably biax ® or other U-shaped) are parallel to short sides **16, 18** of lighting fixture **10**. As fluorescent bulbs **30, 32** have a characteristic directional light distribution pattern oriented in the direction perpendicular to the bulbs, the entire area of the bed **200** is efficiently illuminated. The bulbs **30, 32** and reflector **28** are chosen to provide 100 foot-candles of illumination to the bed **200**. An important feature of the present invention resides in the orientation of the lamps within the lighting **1** fixture which permits the lighting fixture **10** to be packaged in a two foot by four foot configuration and thereby replace a conventional troffer.

Bulbs **22, 26, 30** and **32** are powered by a single electrical source, preferably supplied from wiring within ceiling **100** although the use of a single electric cord (not shown) engaging an electrical socket (not shown) may be used. A single switch module (not shown), either hand-held or built into wall **300**, is used to control bulbs **22** and **26** and a wall switch to control bulbs **30** and **32**.

To use this device, the patient operates the switch module (not shown) to operate selectively bulbs **22** and **26**. Medical personnel control bulbs **30** and **32** of the examination lighting from a switch on the headwall, not easily accessible to the patient.

Thus the several aforementioned objects and advantages are most effectively attained. Although a single preferred embodiment of the invention has been disclosed and described in detail herein, it should be understood that this invention is in no sense limited thereby and its scope is to be determined by that of the appended claims.

What is claimed is:

1. A medical lighting system comprising:

a body;

means for ceiling-mounting said body;

a first light fixture within said body oriented to direct light downwardly to a selected reading area under said body;

a second light fixture within said body oriented to direct light downwardly and outwardly to a vertical wall surface outwardly adjacent from said body whereby light is reflected back to a broad area under said body.

2. The medical lighting system of claim **1** wherein said first light fixture includes a first reflector and a first fluorescent bulb therewithin; and said second light fixture includes a second reflector and a second fluorescent bulb therewithin.

3. A medical lighting system comprising:

a body;

means for ceiling-mounting said body;

a first light fixture within said body oriented to direct light downwardly to a selected reading area under said body;

a second light fixture within said body oriented to direct light downwardly and outwardly to a vertical wall surface outwardly adjacent from said body whereby light is reflected back to a broad area under said body;

a third light fixture within said body oriented to direct light downwardly under said body to a selected patient examination area.

4. The medical lighting system of claim **3** wherein said first light fixture includes a first reflector and a first fluorescent bulb therewithin; said second light fixture includes a second reflector and a second fluorescent bulb therewithin; and said third light fixture includes a third reflector and a fluorescent assembly therewithin.

5. The medical lighting system of claim **4** wherein said fluorescent assembly includes at least one fluorescent bulb with a light distribution pattern oriented in a direction perpendicular to said at least one fluorescent bulb.

6. The medical lighting system of claim **5** wherein said at least one fluorescent bulb is a "biax"-type bulb.

7. The medical lighting system of claim **5** wherein said fluorescent assembly includes at least two fluorescent bulbs with a light distribution pattern oriented in a direction perpendicular to said at least two fluorescent bulbs.

8. The medical lighting system of claim **7** wherein said at least two fluorescent bulbs are "biax"-type bulbs.

9. The medical lighting system of claim **5** wherein said body is rectangular and a first shorter and of said body is designed to abut the vertical wall surface; wherein said first fluorescent light fixture abuts said first snorter end and said first fluorescent light bulb is parallel to said first shorter end; wherein said second fluorescent light fixture is inwardly adjacent to said first fluorescent light fixture and said second fluorescent light fixture is parallel to first shorter end; and wherein said third fluorescent light fixture is outwardly adjacent from said second fluorescent light fixture and abuts a second shorter end of said body; and wherein said at least one fluorescent bulb is parallel to said first shorter end.

10. The medical lighting system of claim **9** wherein said first and second shorter ends are substantially two feet in length and said body includes first and second longer ends which are substantially four feet in length.

11. The medical lighting system of claim **9** wherein said first light fixture illuminates said selected reading area to substantially 70 foot-candles; wherein said second light fixture illuminates said broad area to substantially 50 foot-candles; and wherein said third light fixture illuminates said patient examination area to substantially 100 foot-candles.

12. The medical lighting system of claim **11** wherein said patient examination area is sufficient in size to include a standard hospital bed when said first light fixture is substantially directly over a head of the standard hospital bed, the head of the standard hospital bed substantially abutting the vertical wall surface.

13. The medical lighting system of claim **3** wherein a distribution of light from said first and second light fixtures excludes glare from being directed to a forward area of a standard hospital bed placed below the medical lighting system.

14. The medical lighting system of claim **3** wherein a distribution of light from said first and second light fixtures excludes glare from areas adjacent to a standard hospital bed placed below the medical lighting system.

* * * * *

EXHIBIT B
TO EXPERT DECLARATION
OF THOMAS M. LEMONS

CONFIDENTIAL INFORMATION – TO BE FILED UNDER SEAL
(Subject to Judicial Determination)

EXHIBIT C
TO EXPERT DECLARATION
OF THOMAS M. LEMONS

CONFIDENTIAL INFORMATION – TO BE FILED UNDER SEAL
(Subject to Judicial Determination)

EXHIBIT D
TO EXPERT DECLARATION
OF THOMAS M. LEMONS

TLA-Lighting Consultants, Inc.
7 Pond Street, Salem, MA 01979, Phone 978/745-6870

Thomas M. Lemons, FIES, PE

Received his Bachelor of Science from Purdue University in Electrical Engineering with emphasis on Illumination and Optics in 1956. He is the founder and President of TLA-Lighting Consultants, Inc., which he founded in 1970. Previously he was an applications and development engineer at Sylvania Lighting Products where he worked to develop new products and to find new uses for existing products. In high school and college, he was a partner in a firm which rented and sold theatrical lighting and sound systems.

He is active in many societies, such as the Illuminating Engineering Society of North America (IESNA), International Commission on Illumination (CIE) and United States Institute for Theatre Technology (USITT). He is a Fellow of the IESNA and USITT. He has served as the IESNA Regional VP and the VP of Administration and Operation. He recently served as the Secretary of the United States National Committee of the CIE and he is the U. S. Member of Division 5 (Outdoor and Specialty Lighting) of the CIE. He is a Registered Professional Engineer in the Commonwealth of Massachusetts.

Mr. Lemons has chaired many IESNA and CIE technical committees including the Light Control and Luminaire Design; Sports Lighting; Institutions Lighting; Theatre, TV and Film Lighting and Library Lighting Committees. He has helped prepare energy standards for new buildings (ASHRAE 90-75) as well as one for existing places of public assembly (ASHRAE/IES 100.6-1981) and has helped write a manual of accepted practice for ASHRAE 90-75. He has presented and published over seventy technical papers, has conducted seminars on reflector design and light sources and has taught various illumination subjects. Mr. Lemons has been awarded 16 USA patents and several foreign patents in the field of optics and illumination.

His list of credits include Boston's Fenway Park; New York's Yankee Stadium and Philadelphia's Spectrum Arena as major sports lighting projects. He has provided office lighting designs for the Haworth Center, Holland, Michigan; PG&E Diablo Canyon Power Plant in California and Clark Equipment Company, South Bend, Indiana. He has provided exhibit lighting designs for several Haworth Showrooms; the MSPCA Macomber Farm, Framingham, Massachusetts and the Museum of Fine Arts, Portland, Maine. His optical design clients include Lam Lighting; The 3M Company; Haworth, Inc.; Macbeth Division, Kollmorgan Corporation; Black and Decker; Altman Stage Lighting Company and many others.

TLA-Lighting Consultants, Inc.
7 Pond Street, Salem, MA 01979, Phone 978/745-6870

Thomas M. Lemons, FIES, PE

EDUCATION

BS in EE from Purdue University, 1956

BUSINESS

1970 – Present: Founder and President of TLA-Lighting Consultants, Inc.
1979 – 2001: Co-Founder and President of ARC Sales, Inc.
1956 – 1970: Applications and Development Engineer at Lighting Division
Sylvania Electric Products, Inc.
1950 – 1956: Partner in Audio-Lite Company

IESNA ACTIVITIES

Joined the IESNA (Illuminating Engineering Society of North America) as a student in 1956
Committee Membership:

1. Lamp Subcommittee of Aviation Committee, 1961-1964
2. Sports Lighting Committee, 1965-Present; Chairman 1970-1973
3. Theater, Television and Film Lighting Committee, 1965-Present; Chairman 1978-1981
4. Institutions Committee, 1969-1980, Chairman 1974-1977
5. Energy Management Committee, 1975-1984
6. Library Lighting Committee, 1980-1990; Chairman 1980-1984
7. Light Control and Luminaire Design Committee, 1982-Present; Chairman 1982-83/1990-94/2001-
8. Handbook Committee, Chairman 1989-1992
9. Local Arrangements Committee (Boston Conference), Chairman 1985-1986
10. Group Manager-Design and Applications, 1982-1984
11. Polarized Lighting Task Group, Chairman 1993-1999
12. DSA Committee, 1992-1995, Chairman 1994-1995
13. Technical Review Council, 1994-1996

New England Section -Board of Managers, 1971-1978; President 1975-1977
Northeast Region VP, 1979-1981
Vice President - Administration and Operation, 1987-1989
Elected Fellow, 1975
Board of Fellows,1976-1979, Chairman 1977-1979
Distinguished Service Award, 1983
Designer's Lighting Forum, 1971-1993; RVP Liaison 1979-1980

PROFESSIONAL ACTIVITIES

Registered Professional Engineer in Massachusetts
Member of:
International Commission on Illumination
U. S. Member of Division 5 – Outdoor and Specialty Lighting
Secretary, U. S. National Committee, 1999-2003
United States Institute for Theater Technology (Fellow)
International Dark-Sky Association
Listed in Who's Who In Engineering - Sixth Edition
Author of over seventy technical papers
16 US Patent Awards

TLA CLIENT LIST (partial)

Alm S. A.
Altman Stage Lighting Co.
Appleton Electric
Arc Lighting Systems
Bausch and Lomb
Cliplight Manufacturing Co.
Code 3
Crownlite Manufacturing Co.
Custom Lighting
Custom Metalcraft
Diamond Lights
Deep Sea Power and Light
Deposition Sciences, Inc.
Exide Electronics
Fusion Lighting
Fusion Systems Corp.
Hanovia Lamp
Haworth Inc.
Hi-Tek Div. Lithonia Lighting
House of Troy
Hubbell Lighting
Intrepid Lighting
Kliegal Brothers Lighting
Koehler Manufacturing
Kollmorgan Corp. (Macbeth Div. and Macbeth Color Div.)
Lam, Incorporated
Lampi Corporation
Lightcraft of California, Sterling Lighting Div.
Lighting and Electronics
Lighting Services Inc.
Linear Lighting
Litecontrol Corp.
Mycro Group Co., Musco Lighting Div.
Norelco Lighting Div. of Philips
Osram Sylvania Inc.
Qualite Sports Lighting Inc.
Rosco Laboratories
Simplex Time Recording co.
Space Age Electronics, Inc.
Spualding Lighting Corp.
Sunnlights, Inc.
UDEC Corporation

EXHIBIT E
TO EXPERT DECLARATION
OF THOMAS M. LEMONS

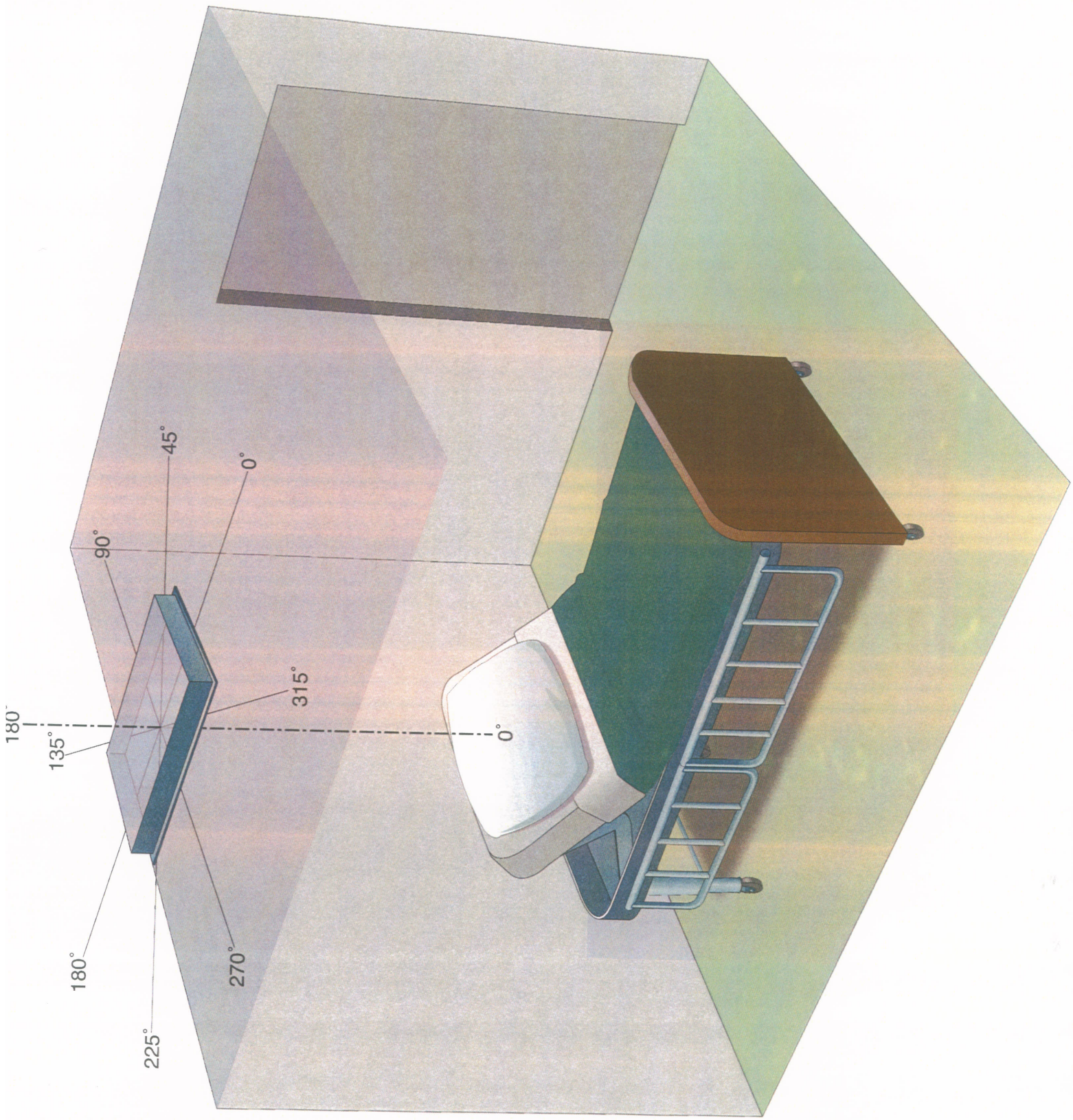

45°
0°
90°
315°
180°
135°
0°
180°
270°
225°

EXHIBIT F
TO EXPERT DECLARATION
OF THOMAS M. LEMONS

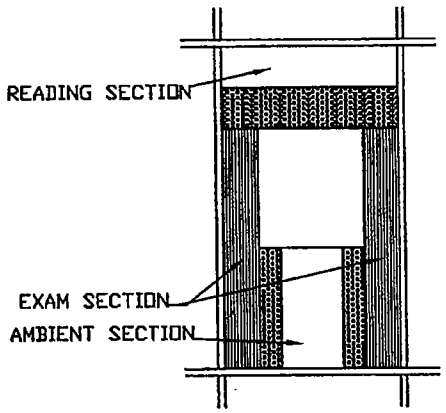
GT TESTING LABORATORY

45 Industrial Way
Wilmington, MA 01887
(978) 657-7600

REPORT NUMBER: G2005043 DATE: 02-11-2005
CATALOG NUMBER: MT2-MEDI-READING-1/39W
LAMP: SYLVANIA FT36DL/835
LUMINAIRE: ARCHITECTURAL LIGHTING SYSTEMS MEDI LIGHT/READING PORTION
BALLAST: SAGE LIGHTING-NXU240RS
32.0 WATTS
REPORT IS BASED ON 2900 LUMENS PER LAMP.

CANDELA DISTRIBUTION

	0.0	22.5	45.0	67.5	90.0	FLUX
0	516	516	516	516	516	
5	508	509	510	515	518	49
15	487	488	488	493	496	138
25	452	452	449	450	453	208
35	404	401	395	388	390	248
45	345	341	329	314	312	253
55	274	269	253	229	219	223
65	183	180	168	139	128	159
75	81	77	76	63	55	76
85	19	18	14	10	9	16
90	1	1	1	1	1	



ZONAL LUMEN SUMMARY

ZONE	LUMENS	%LAMP	%FIXT
0- 30	395	13.6	28.8
0- 40	643	22.2	46.9
0- 60	1119	38.6	81.7
0- 90	1370	47.2	100.0
90-180	0	0.0	0.0
0-180	1370	47.2	100.0

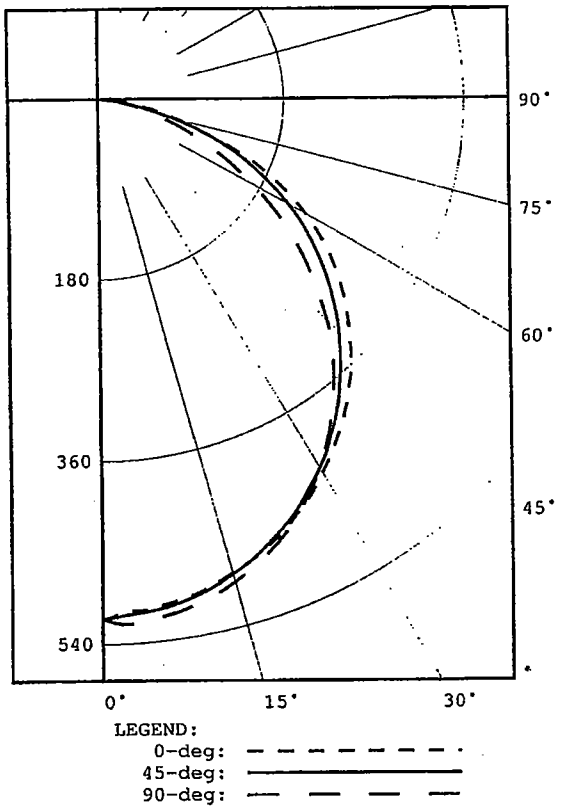
TOTAL LUMINAIRE EFFICIENCY = 47.2 %

CIE TYPE - DIRECT

PLANE	: 0-DEG	90-DEG
SPACING CRITERIA	: 1.2	1.2
SHIELDING ANGLES	: 90	90
PLANE	: 0-DEG	90-DEG
LUMINOUS LENGTH	:10.200	22.920

LUMINANCE DATA IN CANDELA/SQ METER

ANGLE IN DEG	AVERAGE 0-DEG	AVERAGE 45-DEG	AVERAGE 90-DEG
45	3234.	3084.	2924.
55	3166.	2923.	2531.
65	2870.	2635.	2007.
75	2074.	1946.	1408.
85	1445.	1065.	684.



GT 03566

Checked .....
Approved .....

GT TESTING LABORATORY

45 Industrial Way
Wilmington, MA 01887
(978) 657-7600

REPORT NUMBER: G2005043 DATE: 02-11-2005
CATALOG NUMBER: MT2-MEDI-READING-1/39W

CANDELA DISTRIBUTION

	0.0	22.5	45.0	67.5	90.0
0.0	516	516	516	516	516
2.5	509	510	512	519	521
5.0	508	509	510	515	518
7.5	504	506	507	510	515
10.0	500	502	502	506	510
12.5	494	495	496	500	504
15.0	487	488	488	493	496
17.5	480	481	480	484	487
20.0	472	472	470	474	477
22.5	463	462	460	462	466
25.0	452	452	449	450	453
27.5	442	440	436	436	439
30.0	429	428	424	421	424
32.5	417	415	410	405	407
35.0	404	401	395	388	390
37.5	391	388	380	371	372
40.0	376	372	363	353	353
42.5	362	358	346	333	334
45.0	345	341	329	314	312
47.5	328	324	311	294	289
50.0	312	306	292	272	266
52.5	293	288	273	251	243
55.0	274	269	253	229	219
57.5	253	248	233	206	196
60.0	231	226	212	183	172
62.5	208	204	190	161	149
65.0	183	180	168	139	128
67.5	157	156	147	119	108
70.0	127	128	124	100	89
72.5	99	98	101	81	71
75.0	81	77	76	63	55
77.5	63	60	52	45	41
80.0	47	44	37	30	29
82.5	32	30	24	18	18
85.0	19	18	14	10	9
87.5	7	6	5	4	3
90.0	1	1	1	1	1

GT TESTING LABORATORY

45 Industrial Way
Wilmington, MA 01887
(978) 657-7600

REPORT NUMBER: G2005043 DATE: 02-11-2005
CATALOG NUMBER: MT2-MEDI-READING-1/39W

ZONAL LUMEN SUMMARY

0- 5	12.
5- 10	36.
10- 15	59.
15- 20	79.
20- 25	97.
25- 30	111.
30- 35	121.
35- 40	127.
40- 45	128.
45- 50	125.
50- 55	117.
55- 60	105.
60- 65	89.
65- 70	70.
70- 75	48.
75- 80	28.
80- 85	13.
85- 90	3.

GT TESTING LABORATORY

45 Industrial Way
Wilmington, MA 01887
(978) 657-7600

REPORT NUMBER: G2005043 DATE: 02-11-2005

CATALOG NUMBER: MT2-MEDI-READING-1/39W

COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

EFFECTIVE FLOOR CAVITY REFLECTANCE 0.20

RC	80				70				50			30			10			0
RW	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
0	56	56	56	56	55	55	55	55	52	52	52	50	50	50	48	48	48	47
1	52	49	48	46	50	48	47	45	46	45	44	45	43	42	43	42	41	40
2	47	43	40	38	46	42	40	37	41	38	36	39	37	35	38	36	35	34
3	43	38	34	31	42	37	34	31	36	33	31	35	32	30	34	31	30	29
4	39	34	30	27	38	33	29	27	32	29	26	31	28	26	30	27	25	24
5	36	30	26	23	35	30	26	23	29	25	23	28	25	22	27	24	22	21
6	34	27	23	20	33	27	23	20	26	22	20	25	22	20	24	22	20	19
7	31	25	21	18	30	24	21	18	24	20	18	23	20	17	22	20	17	16
8	29	23	19	16	28	22	18	16	22	18	16	21	18	16	21	18	16	15
9	27	21	17	14	26	20	17	14	20	17	14	19	16	14	19	16	14	13
10	25	19	15	13	25	19	15	13	18	15	13	18	15	13	18	15	13	12

ALL CANDELA, LUMENS, LUMINANCE, COEFFICIENT OF UTILIZATION AND VCP VALUES IN THIS REPORT ARE BASED ON RELATIVE PHOTOMETRY WHICH ASSUMES A BALLAST FACTOR OF 1.000. ANY CALCULATIONS PREPARED FROM THESE DATA SHOULD INCLUDE AN APPROPRIATE BALLAST FACTOR.

GT 03569

GT TESTING LABORATORY

45 Industrial Way
Wilmington, MA 01887
(978) 657-7600

REPORT NUMBER: G2005043
CATALOG NUMBER: MT2-MEDI-READING-1/39W

DATE: 02-11-2005

VISUAL COMFORT PROBABILITY TABLE

RATED LUMENS PER LAMP 2900.

100. FC. REFLECTANCES 80/50/20

ROOM W	ROOM L	LUMINAIRES 0 DEG PLANE 8.5	10.0	13.0	16.0	LUMINAIRES 90 DEG PLANE 8.5	10.0	13.0	16.0
20	20	57	61	72	83	62	67	76	85
20	30	53	55	59	69	60	62	67	74
20	40	51	53	55	60	60	60	63	68
20	60	50	52	52	56	60	61	62	64
30	20	59	63	71	81	63	66	73	82
30	30	55	56	58	67	60	61	64	71
30	40	53	53	54	58	60	59	60	64
30	60	51	52	51	54	60	59	59	61
30	80	51	51	50	52	61	61	59	60
40	20	62	65	71	80	65	68	73	81
40	30	57	58	59	66	62	62	63	70
40	40	55	55	54	58	61	60	60	63
40	60	53	53	51	53	61	60	58	59
40	80	53	52	50	51	62	61	58	59
40	100	53	52	49	50	63	62	59	59
60	30	60	61	61	67	63	64	64	69
60	40	57	57	55	58	62	61	60	62
60	60	55	54	52	53	62	61	58	58
60	80	54	53	50	51	63	61	58	58
60	100	54	53	50	50	64	62	58	58
100	40	62	62	60	62	66	65	62	64
100	60	60	59	55	56	65	63	60	60
100	80	58	57	53	54	65	63	59	59
100	100	58	56	52	52	66	64	60	58

GT 03570

EXHIBIT G
TO EXPERT DECLARATION
OF THOMAS M. LEMONS

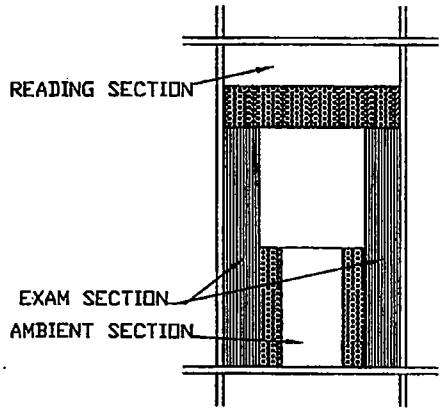
GT TESTING LABORATORY

45 Industrial Way
Wilmington, MA 01887
(978) 657-7600

REPORT NUMBER: G2005044 DATE: 02-14-2005
CATALOG NUMBER: MT2-39W MEDI-AMBIENT
LAMP: SYLVANIA FT36DL/835
LUMINAIRE: ARCHITECTURAL LIGHTING SYSTEMS MEDI-LIGHT
BALLAST: SAGE NXU240RS
61.0 WATTS
REPORT IS BASED ON 2900 LUMENS PER LAMP.

CANDELA DISTRIBUTION

	0.0	22.5	45.0	67.5	90.0	FLUX
0	913	913	913	913	913	
5	906	907	909	911	915	87
15	867	870	883	885	888	248
25	792	804	812	822	830	375
35	685	696	717	744	757	451
45	548	564	608	652	671	470
55	393	421	486	547	570	432
65	243	275	351	410	433	340
75	121	139	188	219	223	185
85	19	21	27	35	37	32
90	0	0	0	0	0	



ZONAL LUMEN SUMMARY

ZONE	LUMENS	%LAMP	%FIXT
0- 30	710	12.2	27.1
0- 40	1160	20.0	44.3
0- 60	2063	35.6	78.7
0- 90	2620	45.2	100.0
90-180	0	0.0	0.0
0-180	2620	45.2	100.0

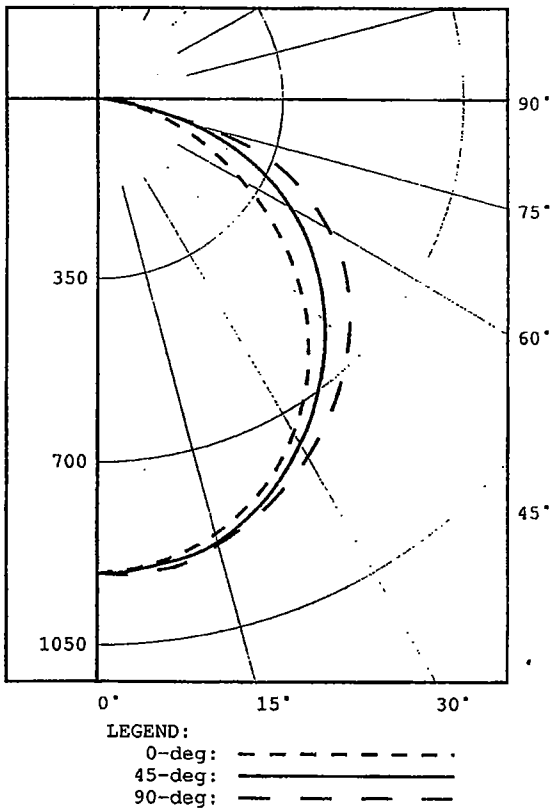
TOTAL LUMINAIRE EFFICIENCY = 45.2 %

CIE TYPE - DIRECT

PLANE	: 0-DEG	90-DEG
SPACING CRITERIA	: 1.2	1.3
SHIELDING ANGLES	: 90	90
PLANE	: 0-DEG	90-DEG
LUMINOUS LENGTH	:22.920	17.400

LUMINANCE DATA IN CANDELA/SQ METER

ANGLE IN DEG	AVERAGE 0-DEG	AVERAGE 45-DEG	AVERAGE 90-DEG
45	3011.	3341.	3687.
55	2662.	3292.	3861.
65	2234.	3227.	3981.
75	1816.	2822.	3347.
85	847.	1204.	1649.



GT 03561

Checked .....
Approved .....

GT TESTING LABORATORY

45 Industrial Way
Wilmington, MA 01887
(978) 657-7600

REPORT NUMBER: G2005044 DATE: 02-14-2005
CATALOG NUMBER: MT2-39W MEDI-AMBIENT

CANDELA DISTRIBUTION

	0.0	22.5	45.0	67.5	90.0
0.0	913	913	913	913	913
2.5	909	911	913	914	917
5.0	906	907	909	911	915
7.5	899	901	904	909	914
10.0	891	893	900	907	911
12.5	880	883	894	898	900
15.0	867	870	883	885	888
17.5	851	856	868	872	875
20.0	833	841	851	856	862
22.5	814	824	833	840	846
25.0	792	804	812	822	830
27.5	768	780	790	805	813
30.0	742	754	766	785	795
32.5	714	727	743	765	777
35.0	685	696	717	744	757
37.5	653	666	691	722	737
40.0	619	633	665	699	716
42.5	585	600	637	676	694
45.0	548	564	608	652	671
47.5	510	529	579	627	648
50.0	473	493	549	601	623
52.5	432	457	517	574	597
55.0	393	421	486	547	570
57.5	354	385	454	516	538
60.0	315	348	421	483	504
62.5	279	310	388	447	470
65.0	243	275	351	410	433
67.5	212	241	313	372	395
70.0	180	207	273	330	350
72.5	150	173	232	280	295
75.0	121	139	188	219	223
77.5	90	104	137	143	139
80.0	61	70	84	89	93
82.5	37	41	47	59	64
85.0	19	21	27	35	37
87.5	7	8	9	10	11
90.0	0	0	0	0	0

GT TESTING LABORATORY

45 Industrial Way
Wilmington, MA 01887
(978) 657-7600

REPORT NUMBER: G2005044 DATE: 02-14-2005
CATALOG NUMBER: MT2-39W MEDI-AMBIENT

ZONAL LUMEN SUMMARY

0- 5	22.
5- 10	65.
10- 15	106.
15- 20	143.
20- 25	174.
25- 30	200.
30- 35	219.
35- 40	231.
40- 45	236.
45- 50	234.
50- 55	224.
55- 60	208.
60- 65	185.
65- 70	156.
70- 75	119.
75- 80	67.
80- 85	27.
85- 90	5.

GT TESTING LABORATORY

45 Industrial Way
Wilmington, MA 01887
(978) 657-7600

REPORT NUMBER: G2005044 DATE: 02-14-2005

CATALOG NUMBER: MT2-39W MEDI-AMBIENT

COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

EFFECTIVE FLOOR CAVITY REFLECTANCE 0.20

RC	80				70				50			30			10			0
RW	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
0	54	54	54	54	53	53	53	53	50	50	50	48	48	48	46	46	46	45
1	49	47	45	43	48	46	44	43	44	43	41	42	41	40	41	40	39	38
2	45	41	38	35	43	40	37	35	38	36	34	37	35	33	36	34	32	31
3	41	36	32	29	40	35	32	29	34	31	28	33	30	28	31	29	27	26
4	37	32	28	25	36	31	27	24	30	27	24	29	26	24	28	26	23	23
5	34	28	24	21	33	28	24	21	27	23	21	26	23	21	25	22	20	19
6	32	25	21	18	31	25	21	18	24	21	18	23	20	18	23	20	18	17
7	29	23	19	16	28	23	19	16	22	19	16	21	18	16	21	18	16	15
8	27	21	17	15	26	21	17	14	20	17	14	20	17	14	19	16	14	13
9	25	19	16	13	25	19	15	13	19	15	13	18	15	13	18	15	13	12
10	24	18	14	12	23	18	14	12	17	14	12	17	14	12	16	14	12	11

ALL CANDELA, LUMENS, LUMINANCE, COEFFICIENT OF UTILIZATION AND VCP VALUES IN THIS REPORT ARE BASED ON RELATIVE PHOTOMETRY WHICH ASSUMES A BALLAST FACTOR OF 1.000. ANY CALCULATIONS PREPARED FROM THESE DATA SHOULD INCLUDE AN APPROPRIATE BALLAST FACTOR.

GT TESTING LABORATORY

45 Industrial Way
Wilmington, MA 01887
(978) 657-7600

REPORT NUMBER: G2005044 DATE: 02-14-2005
CATALOG NUMBER: MT2-39W MEDI-AMBIENT

VISUAL COMFORT PROBABILITY TABLE

RATED LUMENS PER LAMP 2900.

100. FC. REFLECTANCES 80/50/20

ROOM W	ROOM L	LUMINAIRES 0 DEG PLANE 8.5	10.0	13.0	16.0	LUMINAIRES 90 DEG PLANE 8.5	10.0	13.0	16.0
20	20	57	64	75	85	47	54	68	81
20	30	54	57	64	73	44	45	52	64
20	40	54	55	59	65	43	43	45	52
20	60	55	56	57	61	43	43	43	46
30	20	56	62	71	82	50	56	66	79
30	30	53	55	60	69	46	46	51	62
30	40	53	53	56	61	45	44	44	50
30	60	53	53	53	57	44	44	42	44
30	80	55	55	53	56	45	44	42	44
40	20	58	62	70	79	53	59	67	78
40	30	55	55	59	67	49	49	52	62
40	40	54	54	54	59	48	47	45	50
40	60	54	53	52	55	47	45	42	44
40	80	56	54	52	54	47	46	42	43
40	100	57	55	53	54	48	46	42	43
60	30	57	57	58	66	52	52	53	62
60	40	56	55	53	58	50	49	46	50
60	60	56	54	51	53	49	47	43	44
60	80	57	55	51	52	49	47	43	43
60	100	58	56	52	52	49	47	43	43
100	40	60	59	56	59	56	54	50	54
100	60	59	57	53	54	54	52	47	47
100	80	60	58	53	52	53	51	46	46
100	100	61	58	53	52	54	51	46	45

GT 03565

EXHIBIT H
TO EXPERT DECLARATION
OF THOMAS M. LEMONS

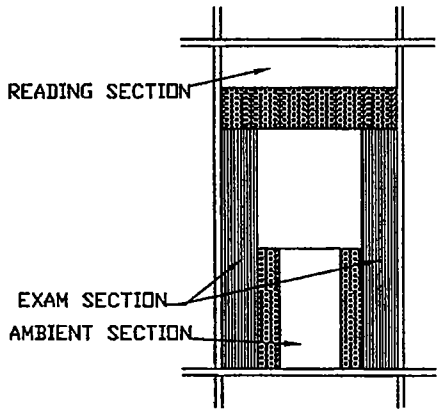
GT TESTING LABORATORY

45 Industrial Way
Wilmington, MA 01887
(978) 657-7600

REPORT NUMBER: G2005045 DATE: 02-14-2005
CATALOG NUMBER: MT2 39W MEDI-EXAM
LAMP: SYLVANIA FT36DL/835
LUMINAIRE: ACHITECTURAL LIGHTING SYSTEMS 39W MEDI-LIGHT/EXAM PORTION
BALLAST: SAGE NXU240RS
61.0 WATTS
REPORT IS BASED ON 2900 LUMENS PER LAMP.

CANDELA DISTRIBUTION

	0.0	22.5	45.0	67.5	90.0	FLUX
0	1393	1393	1393	1393	1393	
5	1381	1380	1383	1383	1383	131
15	1330	1325	1320	1313	1310	372
25	1232	1221	1203	1181	1172	554
35	1091	1064	1014	946	922	627
45	899	823	634	517	480	514
55	603	458	312	253	244	326
65	259	223	167	159	161	192
75	115	102	106	119	130	119
85	20	30	27	27	26	32
90	0	0	0	0	0	



ZONAL LUMEN SUMMARY

ZONE	LUMENS	%LAMP	%FIXT
0- 30	1057	18.2	36.9
0- 40	1684	29.0	58.8
0- 60	2524	43.5	88.1
0- 90	2866	49.4	100.0
90-180	0	0.0	0.0
0-180	2866	49.4	100.0

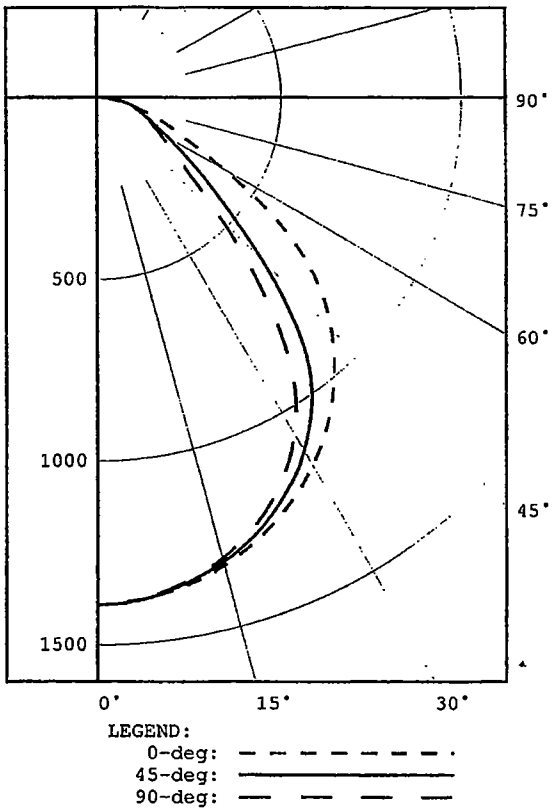
TOTAL LUMINAIRE EFFICIENCY = 49.4 %

CIE TYPE - DIRECT

PLANE	: 0-DEG	90-DEG
SPACING CRITERIA	: 1.2	1.2
SHIELDING ANGLES	: 90	90
PLANE	: 0-DEG	90-DEG
LUMINOUS LENGTH	:36.000	·3.240

LUMINANCE DATA IN CANDELA/SQ METER

ANGLE IN DEG	AVERAGE 0-DEG	AVERAGE 45-DEG	AVERAGE 90-DEG
45	16889.	11911.	9017.
55	13965.	7226.	5651.
65	8141.	5249.	5061.
75	5902.	5440.	6672.
85	3048.	4115.	3963.



GT 03556

Checked .....
Approved .....

GT TESTING LABORATORY

45 Industrial Way
Wilmington, MA 01887
(978) 657-7600

REPORT NUMBER: G2005045 DATE: 02-14-2005
CATALOG NUMBER: MT2 39W MEDI-EXAM

CANDELA DISTRIBUTION

	0.0	22.5	45.0	67.5	90.0
0.0	1393	1393	1393	1393	1393
2.5	1387	1387	1389	1390	1391
5.0	1381	1380	1383	1383	1383
7.5	1373	1371	1371	1369	1368
10.0	1362	1359	1356	1353	1352
12.5	1348	1345	1339	1335	1333
15.0	1330	1325	1320	1313	1310
17.5	1309	1303	1297	1286	1283
20.0	1286	1278	1270	1255	1251
22.5	1260	1251	1238	1220	1214
25.0	1232	1221	1203	1181	1172
27.5	1201	1186	1166	1134	1125
30.0	1167	1150	1120	1083	1068
32.5	1131	1108	1070	1023	1003
35.0	1091	1064	1014	946	922
37.5	1048	1014	946	854	819
40.0	1001	957	858	739	703
42.5	952	896	750	623	588
45.0	899	823	634	517	480
47.5	840	737	525	422	392
50.0	774	641	438	350	325
52.5	694	542	369	294	278
55.0	603	458	312	253	244
57.5	499	383	264	223	216
60.0	398	320	224	197	193
62.5	317	268	192	176	174
65.0	259	223	167	159	161
67.5	217	188	147	148	154
70.0	181	156	131	140	150
72.5	147	127	117	132	142
75.0	115	102	106	119	130
77.5	85	82	93	104	113
80.0	59	65	75	84	90
82.5	37	48	52	58	62
85.0	20	30	27	27	26
87.5	7	8	6	5	5
90.0	0	0	0	0	0

GT 03557

GT TESTING LABORATORY

45 Industrial Way
Wilmington, MA 01887
(978) 657-7600

REPORT NUMBER: G2005045 DATE: 02-14-2005
CATALOG NUMBER: MT2 39W MEDI-EXAM

ZONAL LUMEN SUMMARY

0- 5	33.
5- 10	98.
10- 15	159.
15- 20	214.
20- 25	259.
25- 30	294.
30- 35	314.
35- 40	313.
40- 45	281.
45- 50	232.
50- 55	184.
55- 60	142.
60- 65	107.
65- 70	85.
70- 75	68.
75- 80	51.
80- 85	28.
85- 90	3.

GT TESTING LABORATORY

45 Industrial Way
Wilmington, MA 01887
(978) 657-7600

REPORT NUMBER: G2005045 DATE: 02-14-2005

CATALOG NUMBER: MT2 39W MEDI-EXAM

COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

EFFECTIVE FLOOR CAVITY REFLECTANCE 0.20

RC	80				70				50			30			10			0
RW	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
0	59	59	59	59	57	57	57	57	55	55	55	53	53	53	50	50	50	49
1	55	53	51	49	53	51	50	48	49	48	47	47	46	45	46	45	44	43
2	50	47	44	41	49	46	43	41	44	42	40	43	41	39	41	40	38	37
3	46	42	38	36	45	41	38	35	40	37	35	38	36	34	37	35	33	32
4	43	38	34	31	42	37	34	31	36	33	30	35	32	30	34	31	30	29
5	40	34	30	27	39	34	30	27	33	29	27	32	29	27	31	28	26	25
6	37	31	27	24	36	31	27	24	30	26	24	29	26	24	28	26	24	23
7	35	28	25	22	34	28	24	22	27	24	22	27	24	21	26	23	21	20
8	32	26	22	20	32	26	22	20	25	22	19	25	22	19	24	21	19	18
9	30	24	20	18	30	24	20	18	23	20	18	23	20	18	22	20	18	17
10	29	22	19	16	28	22	19	16	22	18	16	21	18	16	21	18	16	15

ALL CANDELA, LUMENS, LUMINANCE, COEFFICIENT OF UTILIZATION AND VCP VALUES IN THIS REPORT ARE BASED ON RELATIVE PHOTOMETRY WHICH ASSUMES A BALLAST FACTOR OF 1.000. ANY CALCULATIONS PREPARED FROM THESE DATA SHOULD INCLUDE AN APPROPRIATE BALLAST FACTOR.

GT TESTING LABORATORY

45 Industrial Way
Wilmington, MA 01887
(978) 657-7600

REPORT NUMBER: G2005045 DATE: 02-14-2005
CATALOG NUMBER: MT2 39W MEDI-EXAM

VISUAL COMFORT PROBABILITY TABLE

RATED LUMENS PER LAMP 2900.

100. FC. REFLECTANCES 80/50/20

ROOM W	ROOM L	LUMINAIRES 0 DEG PLANE 8.5	10.0	13.0	16.0	LUMINAIRES 90 DEG PLANE 8.5	10.0	13.0	16.0
20	20	35	37	41	46	40	48	59	63
20	30	30	31	33	36	30	36	46	53
20	40	29	29	29	31	27	30	37	44
20	60	28	29	28	28	25	27	30	35
30	20	36	40	44	49	40	47	57	61
30	30	31	33	34	38	30	35	44	51
30	40	29	30	30	31	27	29	35	41
30	60	28	29	28	28	25	26	28	33
30	80	29	29	27	28	26	27	26	29
40	20	38	42	46	51	42	48	56	60
40	30	32	34	36	40	32	36	44	50
40	40	30	31	31	33	28	30	35	40
40	60	29	29	28	29	26	27	28	32
40	80	29	30	28	28	27	27	25	28
40	100	31	30	28	28	29	28	25	26
60	30	34	36	37	41	34	38	44	49
60	40	31	32	32	34	29	31	34	40
60	60	30	30	29	30	28	28	28	32
60	80	30	29	27	28	28	27	25	28
60	100	31	30	27	28	29	28	25	26
100	40	35	35	34	37	34	35	37	42
100	60	33	33	30	32	32	31	30	33
100	80	33	32	29	30	32	30	27	29
100	100	34	32	29	29	33	31	26	27

EXHIBIT I
TO EXPERT DECLARATION
OF THOMAS M. LEMONS

UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

GENLYTE THOMAS GROUP, LLC
Plaintiff

v.

ARCHITECTURAL LIGHTING SYSTEMS
Defendant

STATEMENT OF THOMAS M. LEMONS A PERSON SKILLED IN THE LIGHTING ARTS

INTRODUCTION

I have been asked by the Attorney for the plaintiff to provide an interpretation of certain terms in Patent 5,038,254 (the '254 patent) as one skilled in the medical lighting art.

QUALIFICATIONS

My Curriculum Vitae is attached hereto (Exhibit A) including a list of clients, a list of patents and other awards as well as all technical publications. I am a registered professional engineer (electrical) who has practiced product and lighting installation design in the lighting field for 56 years. This experience has provided me an appreciation of the level of skills that existed in the period from 1990 through 1991. I have been granted 17 U. S. Patents which have provided me a general appreciation of the standards of patentability – namely novelty, utility and non-obviousness.

My lighting career started in 1950 when at the age of 16 I founded my own theater lighting and sound business, Audio-Lite Company. I operated this business while attending engineering school at Purdue University and sold it shortly after graduation. After receiving my B.S. in Electrical Engineering from Purdue in 1956, I was employed by Sylvania Electric Products, Inc. as a lighting applications and development engineer where I worked for 13 years until 1970. In 1970 I founded TLA-Lighting Consultants, Inc. which I still operate today. In 1979, I also co-founded ARC Sales, Inc., a specialty lighting product sales and manufacturing company, which I operated until I sold it in 2001.

I have found during my lighting career that a "Person of Ordinary Skill in the Art" has a combination of training and experience. The training can either be four years of technical schooling such as an engineering degree plus four years of experience in product/optical design or 8 years of on the job training which includes product and optical design for the

specific lighting market in question. As seen in my CV, I meet and exceed the schooling and experience requirements and my consulting to several medical product manufacturers including ALM S.A. where I designed a patented surgical light (U. S. Patent No. 5,485,319) identifies that I have the medical lighting experience.

Some of my lighting design projects include navigational lighting of the Panama Canal, field lighting for Yankee Stadium and Fenway Park and product and facility design for Haworth Furniture in Holland, Michigan. I have been a member of many technical committees of the Illuminating Engineering Society of North America ("IESNA") as well as the International Commission on Illumination ("CIE"). This has included the Light Control and Luminaire Design Committee of the IESNA that I presently chair. In the CIE, I am designated as the USA Expert for Division 5 that prepares standards and reports on outdoor and specialty lighting. I am a Fellow of the IESNA and the United States Institute for Theatre Technology.

My rate of compensation paid by Genlyte for my services is $140 per hour and I have not yet received compensation for my ALS activity. I would also note that I was contacted earlier this year by ALS to be their expert in this case but I was previously contacted by Genlyte in January of 2005 to be their expert and therefore I declined.

TESTIFYING EXPERIENCE IN THE PRIOR FIVE YEARS

To the best of my recollection, I have testified at trial or by deposition in the following cases in the past 5 years:

2001 – *L. S. I., Inc. v. Spaulding Lighting Corp.* Deposition @ Hunton Williams, Washington, DC

2002-3 – *Genlyte Thomas Group, LLC v. National Service Industries, Inc. et al,* District Court of the Western District of Kentucky

2004 – *Ferrel Rimer v. Regal Cinemas, Inc.* Circuit Court, Broward County, Florida

2004-5 – *Henry Boyer and Kathleen Boyer v. Fleet National Group, Inc., Tiverton Associates and John Doe,* Providence, RI Superior Court

2006 – *Sportlite, Inc. v. Genlyte Thomas Group, LLC,* District Court of Arizona

2006 – *TELE-CONS, Inc. and Michael Moisin v. Harmony Lighting, Inc. et al.* District Court of MA, (Technical Expert for Judge Lindsay)

2006 – *Jeow N. Tseng v. Home Depot and Wal-Mart Stores, Inc.,* Western District of Washington

MATERIAL I CONSIDERED IN FORMING MY OPINION

The materials that I have used in creating this statement are as follows:

U. S. Patent No. 5,038,254
Webster's New Collegiate Dictionary, 1979
IESNA Lighting Handbook, Reference Volume, 1984
IESNA Lighting Handbook, Application Volume, 1987
IESNA Lighting Handbook, 8th Edition, 1993

CLAIM CONSTRUCTION

There are two independent claims (Claims 1 and 3) and several dependent claims (Claims 2, 4, 5, 7, 13 and 14) that are at issue. There is one term that requires a 112/6 Analysis because of the use of the word *means*. My understanding of the meaning of specific terms in these claims including the 112/6 analysis of one is as follows:

Claim 1
112/6 Analysis

This term uses the word "means" and thereafter recites the function performed by the "means". The following provides a meaning for the function and also identifies the structure for performing the function.

TERM	MEANING/FUNCTION	COMMENT/STRUCTURE
Means for ceiling-mounting said body	Surface or recessed installation on or into a ceiling.	Column 3, starting at line 12 of '254 patent states "lighting fixture 10 to be packaged in a two foot by four foot configuration and thereby replace a conventional troffer." The methods used for mounting conventional troffers are well known in the industry. A conventional surface mounted troffer is fastened directly to a ceiling using mounting holes provided in the back surface of the body. Anchor bolts or screws can be used to mount through these holes directly to a structural element in or behind the ceiling and threaded rod can be used at these holes where the ceiling will not support the luminaire and it must be suspended from structural elements up above the ceiling. A conventional recessed troffer is mounted into two primary types of ceilings which are a grid or T-bar

TERM	MEANING/FUNCTION	COMMENT/STRUCTURE
		construction and a plaster or drywall construction. A grid or T-bar ceiling with the normal 2 x 2 or 2 x 4 support member spacing allows the troffer to be directly mounted into a two foot by four foot (or 2x2) opening in the grid since the face of the troffer has a flat flange around it that sits on the inside flat face surface of the grid. When recessed into a plaster or drywall ceiling, a plaster frame is normally used that again provides a lip around a two foot by four foot (or 2x2) opening that allows the troffer face flange to rest on the lip. The grid or T-bar ceiling allows the greatest ease to move the luminaire when a patient room changes from a single to a multi patient room. It is also fairly easy to change the location of a surface mounted luminaire and it is very difficult to move fixtures recessed into plaster of drywall ceilings.

Other Claim 1 Terms

TERM	MEANING	COMMENT/SUPPORT
oriented to direct light	Set or arranged to direct illumination.	Column 2, starting at line 45 of '254 patent states "to provide a direct light to reading area 400 of bed 200".
downwardly	A direction below the luminaire	Column 1, starting at line 65 of '254 patent states "The lighting system is …placed substantially over the head of the patent's bed." In column 2, starting at line 3 states "A first light fixture…designed to direct light toward the forward portion of the patient's bed to allow a patient to read comfortably." Therefore the light is directed down onto the bed.

TERM	MEANING	COMMENT/SUPPORT
a selected reading area	A zone where a patient reads material.	Column 1 starting at line 3 states "A first light fixture…designed to direct light toward the forward portion of the patient's bed to allow a patient to read comfortably." Therefore the zone is at an area between the patient's chest and waist.
downwardly and outwardly	A direction below and away from center.	Column 2, starting at line 53 and again at lines 58 and 63 of '254 patent states that the ambient fixture directs light "to reflect or bounce light from wall 300", "configured so as not to direct glare toward the head of the bed" and "configured so as not to direct glare to areas adjacent to bed 200". Therefore the fixture directs light to the bed and area around the bed.
reflected back	The redirection of light by a surface.	Column 2, starting at line 53 states "to reflect or bounce light from wall 300 thereby providing ambient light to bed 200."
broad area	The area of the bed and around the bed.	As noted above the light is directed over the bed and area around the bed.

Claims 2 & 4

TERM	MEANING	COMMENT/SUPPORT
reflector	A device used to redirect flux from a source by the process of reflection.	The IESNA Lighting Handbook, Reference Volume, 1984, provides this definition based on accepted industry practice which is consistent with the '254 patent. (Exhibit B)

Claim 3

The same terms as listed for Claim 1 plus:

TERM	MEANING	COMMENT/SUPPORT
a selected patient examination area	An area of the patient's bed used for examination.	Column 2 starting at line 15 states that "the entire area of the bed is efficiently illuminated" by the examination light. The examination area will depend on the type of procedure performed on the patient and therefore the light is only needed in an area of the bed used for examinations by doctors and nurses rather than the whole bed as stated in the above quote for a preferred embodiment.

Claims 4, 5 & 7

TERM	MEANING	COMMENT/SUPPORT
fluorescent assembly	A unit of lamps and sockets.	Column 4, starting at line 8 states "said third light fixture includes a third reflector and a fluorescent assembly therewithin." Therefore the fluorescent assembly is the fluorescent lamps and sockets that with the reflector comprise the third light fixture.

Claims 5 & 7

TERM	MEANING	COMMENT/SUPPORT
light distribution pattern	A three dimensional array of flux emitted by a lamp.	Column 3, starting at line 4 states "fluorescent bulbs 30, 32 have a characteristic directional light distribution pattern oriented in the direction perpendicular to the bulbs".

Claims 13 & 14

TERM	MEANING	COMMENT/SUPPORT
glare	The sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted to cause annoyance, discomfort or loss in visual performance and visibility.	The IESNA Lighting Handbook, Reference Volume, 1984, provides this definition based on accepted industry practice which is consistent with the '254 patent. (Exhibit B)

DISCUSSION

The importance of the identification that the product is a medical light is critical for a "Person of Ordinary Skill in the Art" to understand the application need and required performance of the product. In the IESNA Handbook, Application Volume, 1987, in the section on lighting design considerations for patient rooms, the following statement is made:

> "The patient, nurses, doctors and housekeeping personnel require different illuminance levels, in any given room, to accommodate their individual needs. This range of lighting is needed for a variety of nursing services; it should be acceptable to all patients occupying the same room, and satisfy the lighting needs and desires of the patients whose only field or view may be the ceiling."

Without the knowledge and experience in lighting patient beds, it is not possible to understand how to design an acceptable patient bed lighting system without reverse engineering an existing acceptable product. In addition to the above quote, the IESNA Lighting Handbook, Application Volume, 1987, identifies the state of the art of patient room lighting prior to 1990 as illustrated by Figures 7-6 and 7-8 (Exhibit C). In the IESNA Lighting Handbook, 8th Edition (1993), the Genlyte product made according to the '254 patent is illustrated in Figure 17-7 (Exhibit D) which replaced the previous illustrations and identifies the medical industry acceptance of this product within three years.

It must be noted that the claims for the second light fixture (the ambient light) has two designated directions for the directed light. The first is the directing of light down onto the area below the assembly and the second is to direct light onto the adjacent wall. As noted in the above quote from the IESNA Handbook, the patient's only view may be the ceiling and therefore the optical design of the luminaire must limit glare which might be directed down into the eyes of the patient or into the eyes of others in the room. As noted by the definition of "glare", the viewer's adaptation is a factor which limits glare and the

illumination on the wall increases the illuminated area seen by the patient which raises the eye adaptation and reduces the potential for glare.

CONCLUSION

In preparing the claim definitions I have used material disclosed and taught by the patent, the reference items I have cited, dictionary and industry definitions of terms and the knowledge I have gained in 56 years work in the lighting industry. I believe that this report is a true and correct evaluation of the claims in question.

Executed this 18th day of May, 2006

Thomas M. Lemons
TLA-Lighting Consultants, Inc.
7 Pond Street, Salem, MA 01970

EXHIBIT A

Thomas M. Lemons, FIES, PE

Received his Bachelor of Science from Purdue University in Electrical Engineering with emphasis on Illumination and Optics in 1956. He is the founder and President of TLA-Lighting Consultants, Inc., which he founded in 1970. Previously he was an applications and development engineer at Sylvania Lighting Products where he worked to develop new products and to find new uses for existing products. In high school and college, he was a partner in a firm which rented and sold theatrical lighting and sound systems.

He is active in many societies, such as the Illuminating Engineering Society of North America (IESNA), International Commission on Illumination (CIE) and United States Institute for Theatre Technology (USITT). He is a Fellow of the IESNA and USITT. He has served as the IESNA Regional VP and the VP of Administration and Operation. He recently served as the Secretary of the United States National Committee of the CIE and he is the U. S. Member to Division 5 (Outdoor and Specialty Lighting) of the CIE. He is a Registered Professional Engineer in the Commonwealth of Massachusetts.

Mr. Lemons has chaired many IESNA and CIE technical committees including the Light Control and Luminaire Design; Sports Lighting; Institutions Lighting; Theatre, TV and Film Lighting and Library Lighting Committees. He has helped prepare energy standards for new buildings (ASHRAE 90-75) as well as one for existing places of public assembly (ASHRAE/IES 100.6-1981) and has helped write a manual of accepted practice for ASHRAE 90-75. He has presented and published over seventy technical papers, has conducted seminars on reflector design and light sources and has taught various illumination subjects. Mr. Lemons has been awarded 17 USA patents and several foreign patents in the field of optics and illumination.

His list of credits include Boston's Fenway Park; New York's Yankee Stadium and Philadelphia's Spectrum Arena as major sports lighting projects. He has provided office lighting designs for the Haworth Center, Holland, Michigan; PG&E Diablo Canyon Power Plant in California and Clark Equipment Company, South Bend, Indiana. He has provided exhibit lighting designs for several Haworth Showrooms; the MSPCA Macomber Farm, Framingham, Massachusetts and the Museum of Fine Arts, Portland, Maine. His optical design clients include Lam Lighting; The 3M Company; Haworth, Inc.; Macbeth Division, Kollmorgan Corporation; Black and Decker; Altman Stage Lighting Company and many others.

TLA - Lighting Consultants, Inc.
Seven Pond Street Salem, MA 01970 978-745-6870 Fax 978-741-4420

Thomas M. Lemons, FIES, PE

EDUCATION

BS in EE from Purdue University, 1956

BUSINESS

1970 – Present: Founder and President of TLA-Lighting Consultants, Inc.
1979 – 2001: Co-Founder and President of ARC Sales, Inc.
1956 – 1970: Applications and Development Engineer at Lighting Division
Sylvania Electric Products, Inc.
1950 – 1956: Partner in Audio-Lite Company

IESNA ACTIVITIES

Joined the IESNA (Illuminating Engineering Society of North America) as a student in 1956
Committee Membership:

1. Lamp Subcommittee of Aviation Committee, 1961-1964
2. Sports Lighting Committee, 1965-Present; Chairman 1970-1973
3. Theater, Television and Film Lighting Committee, 1965-Present; Chairman 1978-1981
4. Institutions Committee, 1969-1980, Chairman 1974-1977
5. Energy Management Committee, 1975-1984
6. Library Lighting Committee, 1980-1990; Chairman 1980-1984
7. Light Control and Luminaire Design Committee, 1982-Present; Chairman 1982-83/1990-94/2001-
8. Handbook Committee, Chairman 1989-1992
9. Local Arrangements Committee (Boston Conference), Chairman 1985-1986
10. Group Manager-Design and Applications, 1982-1984
11. Polarized Lighting Task Group, Chairman 1993-1999
12. DSA Committee, 1992-1995, Chairman 1994-1995
13. Technical Review Council, 1994-1996

New England Section -Board of Managers, 1971-1978; President 1975-1977
Northeast Region VP, 1979-1981
Vice President - Administration and Operation, 1987-1989
Elected Fellow, 1975
Board of Fellows,1976-1979, Chairman 1977-1979
Distinguished Service Award, 1983
Designer's Lighting Forum, 1971-1993; RVP Liaison 1979-1980

PROFESSIONAL ACTIVITIES

Registered Professional Engineer in Massachusetts
Member of:
International Commission on Illumination
USA Member of Division 5 – Exterior and Specialty Lighting
Secretary, U. S. National Committee, 1999-2003
United States Institute for Theater Technology (Fellow)
International Dark-Sky Association
Listed in Who's Who In Engineering - Sixth Edition
Author of over seventy technical papers
17 U. S. and 5 Canadian Patent Awards

TLA - Lighting Consultants, Inc.
Seven Pond Street Salem, MA 01970 978-745-6870 Fax 978-741-4420

TLA-Lighting Consultants, Inc.

7 Pond Street, Salem, MA 01970

CLIENT LIST (partial)

Alm S. A.
Altman Stage Lighting Co.
Appleton Electric
Arc Lighting Systems
Bausch and Lomb
Cliplight Manufacturing Co.
Code 3
Crownlite Manufacturing Co.
Custom Lighting
Custom Metalcraft
Diamond Lights
Deep Sea Power and Light
Deposition Sciences, Inc.
Exide Electronics
Fusion Lighting
Fusion Systems Corp.
Hanovia Lamp
Haworth Inc.
Hi-Tek Div. Lithonia Lighting
House of Troy
Hubbell Lighting
Intrepid Lighting
Kliegal Brothers Lighting
Koehler Manufacturing
Kollmorgan Corp. (Macbeth Div. and Macbeth Color Div.)
Lam, Incorporated
Lampi Corporation
Lightcraft of California, Sterling Lighting Div.
Lighting and Electronics
Lighting Services Inc.
Linear Lighting
Litecontrol Corp.
Mycro Group Co., Musco Lighting Div.
Norelco Lighting Div. of Philips
Osram Sylvania Inc.
Qualite Sports Lighting Inc.
Rosco Laboratories
Simplex Time Recording co.
Space Age Electronics, Inc.
Spualding Lighting Corp.
Sunnlights, Inc.
UDEC Corporation

Awards
Thomas M. Lemons

U.S. Patents:

Spotlight Lamp No. 3,428,800

Sky Projector No. 3,762,083

High Intensity Spotlight No. 3,940,606 (RE 31,003)

High Intensity Indirect Lighting Fixture No. 3,950,638

Replaceable Light Source Assembly No. 4,536,832

Interior Indirect Lighting No. 4,569,003

Modulated Optical Energy Source No. 4,668,869

Outdoor Lighting System No. 4,864,476

Task Light No. 5,036,436

Asymmetric Sports Luminaire No. 5,313,379

Visual Signaling Device No. 5,390,095

Medical Device No. 5,485,319

Emergency Strobe Light No. 5,622,427

Glare Control Sports Lighting Luminaire No. 5,730,521

Emergency Strobe Light No. 5,865,527

Method and Apparatus for Leak Detection No. 6,177,678

LED Inspection Lamp No. 6,979,104

Society of Motion Picture and Television Engineers - Journal
Honorable Mention Award for 1975

IES of NA - Distinguished Service Award in 1983

Made a Fellow of *IES* in 1975 and the *USITT* in 1979

Listed in *Who's Who in Engineering* - Sixth Edition

ASHRAE Award of Merit for STD 90-75

TLA - Lighting Consultants, Inc.
Seven Pond Street Salem, MA 01970 978-745-6870 Fax 978-741-4420

PUBLICATIONS

PUBLISHER:

OPTICAL DESIGN OF REFLECTORS - 3RD EDITION (1989)

CONTRIBUTING EDITOR:

LIGHTING DESIGN AND APPLICATION
TENNIS INDUSTRY
SYLVANIA LIGHTING HANDBOOK
CHAPTER ON LIGHTING FOR PLANNING AREAS AND FACILITIES
FOR HEALTH, PHYSICAL EDUCATION AND RECREATION
(PUBLISHED IN 1984 BY AAHPER AND ATHLETIC INSTITUTE)
OPTICAL ENCYCLOPEDIA AND DIRECTORY
ASHRAE 90-75 MANUAL OF ACCEPTABLE PRACTICE
HAWORTH DEALER DIALOG
IEEE GRAY BOOK – CHAPTER 10, LIGHTING

TECHNICAL PAPERS:

LABORATORY TESTING OF PANCAKE LIGHTS (1962)

QUARTZ-IODINE LAMP LIMITATIONS LEAD TO NEW DESIGNS (1964)

NEW LIGHT SOURCES AND ASSOCIATED OPTICAL DESIGNS FOR THEATER AND TELEVISIONS (1965)

METALLIC VAPOR LAMPS IN CRITICAL COLOR APPLICATIONS (1966)

INDOOR LIGHTING FOR SPORTS AND RECREATIONAL ACTIVITIES (1967)

TUNGSTEN-HALOGEN REPLACEMENT LAMPS FOR STANDARD INCANDESCENT LAMPS (1967)

CHARACTERISTICS OF THEATRICAL LIGHTING EQUIPMENT USING TUNGSTEN-HALOGEN LAMPS (1968)

FIXTURES - NEW CONCEPTS AND THEIR EXPANDING MARKET (1968)

STUDIO AND TELEVISION LUMINAIRE PERFORMANCE USING TUNGSTEN HALOGEN LAMPS (1968)

THE RATING PROBLEM - LAMPS IN LUMINAIRES (1968)

TUNGSTEN-HALOGEN LAMP STUDIO TESTS (2 REPORTS) (1968)

APPLICATION OF TUNGSTEN-HALOGEN LAMPS IN THEATRICAL LUMINAIRES (1968)

LIGHTING FOR COLOR TELEVISION (1968)

A CONCLUSIVE REPORT ON HIGH WATTAGE TUNGSTEN-HALOGEN LAMPS (1969)

TELEVISION AND FILM APPLICATIONS OF TUNGSTEN-HALOGEN LAMPS (1969)

KNOW YOUR LIGHTS – BUT DON'T FORGET YOUR SHADOWS (1969)

TUNGSTEN-HALOGEN LAMPS - A TUTORIAL PAPER (1969)

SURVEY OF REMOTE LIGHTING SYSTEMS FOR COLOR TELEVISION (1969)

HIGH INTENSITY DISCHARGE LAMPS AND THEIR ENVIRONMENT (1970)

LIGHTS, CAMERA, ACTION (1970)

DESIGN PARAMETERS FOR TUNGSTEN-HALOGEN LAMP LUMINAIRES (1971)

A SEQUEL TO THE BALLAST STORY (1971)

A CHALLENGE TO THE LIGHTING INDUSTRY (1971)

SCALE MODELS USED IN LIGHTING SYSTEM DESIGN AND EVALUATION (1972)

EFFECTIVE USE OF ESI (1973)

CURRENT SOURCES FOR STADIUM LIGHTING (1973)

A LANDMARK CORPORATE SYMBOL (1973)

MODELS AND CONTRAST RENDITION FACTOR (1973)

TENNIS LIGHTING CONCEPTS (1973)

NEEDED: HID BALLAST CERTIFICATION DATA (1973)

THE LATEST IN SOURCES (1974)

OPTIMIZING OUTDOOR RECREATIONAL LIGHTING DESIGN (1974)

A NEW DAYLIGHT LIGHT SOURCE (1974)

MORE ABOUT HMI LIGHTING AT PHOTOKINA '74 (1974)

TV NEWS APPLICATIONS OF HMI LAMPS (1974)

HID LAMP FLICKER PROBLEMS (1974)

SCALE MODELS USED TO DEMONSTRATE ESI PERFORMANCE DIFFERENCES (1975)

A NEW HID BALLAST CONCEPT (1975)

NEW CONCEPTS IN NEWS FILM AND TV REMOTE LIGHTING SYSTEMS (1975)

INTENT AND EXTENT - THE ENERGY TRADEOFFS (1975)

THE DEVELOPMENT OF AN ENERGY PERFORMANCE STANDARD (1975)

LIGHTING SYSTEM APPLICATIONS WHICH MEET INTERIOR DESIGN CONSIDERATIONS (1976)

SCALE MODELS USED TO INVESTIGATE OFFICE TASK LIT SYSTEMS FURNITURE (1977)

IMPROVED OPERATION OF HID LAMPS (1978)

HMI LAMPS (1978)

CAN VISUAL CLARITY BE ILLUSTRATED (1978)

TRENDS IN OPTICAL TECHNOLOGY - LIGHTING (1979)

A GUIDE FOR THE LIGHTING DESIGN OF OPEN PLAN OFFICES (1979)

EXPLORING INDIRECT LIGHTING (1979)

DESIGN FACTORS FOR REFLECTORS (1980)

VISUAL NEEDS, RELATIONSHIP OF LIGHT, SET PROCEDURE FOR OPEN PLAN LIGHTING (1980)

OPEN PLAN OFFICE LIGHTING (1980)

LIGHTING DEVELOPMENTS EXHIBITED AT PHOTOKINA 1980 (1980)

SELECTING LIGHTING SYSTEMS (1981)

ENERGY SAVING LIGHTING SYSTEM DESIGN (1982)

EVALUATION OF FLICKER IN INTERIOR ILLUMINATION (1982)

SOURCES OF DISCOMFORT/ANNOYANCE (1982)

LENSES WHICH IMPROVE SKYLIGHT PERFORMANCE (1983)

FLICKER IN LIGHT SOURCES CAN BE A PROBLEM (1984)

LIGHT SOURCES, INCOHERENT (1984)

LIGHTING AND CRT'S (1984)

TASK LIGHTS OR NICHE LIGHTS? (1984)

SELECTED LAMPS (1985)

TRIAMBIENT LIGHTING VERSUS CEILING LIGHTING (1985)

UPDATE ON FLUORESCENTS (1985)

HID LAMP STARTERS AND IGNITORS (1986)

INDIRECT RIM LIGHTING FOR BUILDING INTERIORS (1987)

SPECTRAL AND TEMPORAL CHARACTERISTICS OF LIGHT SOURCES (1988)

SURGICAL LIGHTING OVERVIEW (1990)

CONTINUOUS LIGHTING FOR HIGH SPEED PHOTOGRAPHY (1991)

ENERGY EFFICIENT LIGHTING OPTIONS (1992)

SURGICAL LIGHTS (1993)

THE ELLIPSOIDAL SHOOT OUT - VARIABILITY OF LAMPS (1993)

POLARIZED LIGHTING - BASIC CONCEPTS (1995)

FACADE LIGHTING TO ENHANCE BUILDING ARCHITECTURE (1995)

OUTDOOR SPORTS LIGHTING LUMINAIRE POSITIONS (1995)

NOVEL LIGHTING INDUSTRY COATING APPLICATIONS (1995)

ELECTRONIC BALLASTS FOR HID LAMPS (1995)

MODELING FOR SPORTS LIGHTING (1999)

EXTERIOR LUMINAIRE BEAM PATTERNS (2005)

EXHIBIT B

IES LIGHTING HANDBOOK

1984 Reference Volume

JOHN E. KAUFMAN, PE, FIES
Editor

JACK F. CHRISTENSEN
Associate Editor

Published by
ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA
345 East 47th Street, New York, N.Y. 10017

ISBN 0-87995-015-3
Library of Congress Catalog Card Number: 84-81835

Second printing: March, 1990

PRINTED IN THE UNITED STATES OF AMERICA

faces based on the average flux transfer between surfaces.

fog (adverse-weather) lamps: units which may be used in lieu of headlamps or in connection with the lower beam headlights to provide road illumination under conditions of rain, snow, dust or fog.

follow spot: any instrument operated so as to follow the movement of an actor. Follow spots are usually high intensity controlled beam luminaires.

footcandle, fc: the unit of illuminance when the foot is taken as the unit of length. It is the illuminance on a surface one square foot in area on which there is a uniformly distributed flux of one lumen, or the illuminance produced on a surface all points of which are at a distance of one foot from a directionally uniform point source of one candela. See Fig. 1-2.

footcandle meter: See *illuminance meter.*

footlambert, fL: a unit of luminance equal to $1/\pi$ candela per square foot, or to the uniform luminance of a perfectly diffusing surface emitting or reflecting light at the rate of one lumen per square foot, or to the average luminance of any surface emitting or reflecting light at that rate. See *units of luminance.* The use of this unit is deprecated.

NOTE: The average luminance of any reflecting surface in footlamberts is, therefore, the product of the illumination in footcandles by the luminous reflectance of the surface.

footlights: a set of striplights at the front edge of the stage platform used to soften face shadows cast by overhead luminaires and to add general toning lighting from below.

form factor, f_{1-2}: the ratio of the flux directly received by surface 2 (and due to lambertian surface 1) to the total flux emitted by surface 1. It is used in *flux transfer theory.*

$$f_{1-2} = (\Phi_{1-2})/(\Phi_1)$$

formation light: a navigation light especially provided to facilitate formation flying.

fovea: a small region at the center of the retina, subtending about two degrees, containing only cones but no rods and forming the site of most distinct vision.

foveal vision: See *central vision.*

Fresnel spotlight: a luminaire containing a lamp and a Fresnel lens (stepped "flat" lens with a textured back) which has variable field and beam angles obtained by changing the spacing between lamp and lens (flooding and spotting). The Fresnel produces a smooth, soft edge, defined beam of light.

fuselage lights: aircraft aeronautical lights, mounted on the top and bottom of the fuselage, used to supplement the navigation light.

G

gas-filled lamp: an incandescent lamp in which the filament operates in a bulb filled with one or more inert gases.

gaseous discharge: the emission of light from gas atoms excited by an electric current.

general color rendering index (R_a): measure of the average shift of 8 standardized colors chosen to be of intermediate saturation and spread throughout the range of hues. If the Color Rendering Index is not qualified as to the color samples used, R_a is assumed.

general diffuse lighting: lighting involving luminaires which distribute 40 to 60 per cent of the emitted light downward and the balance upward, sometimes with a strong component at 90 degrees (horizontal). See *direct-indirect lighting.*

general lighting: lighting designed to provide a substantially uniform level of illumination throughout an area, exclusive of any provision for special local requirements. See *direct lighting, semi-direct lighting, general diffuse lighting, direct-indirect lighting, semi-indirect lighting, indirect lighting, ceiling area lighting, localized general lighting.*

general purpose floodlight (GP): a weatherproof unit so constructed that the housing forms the reflecting surface. The assembly is enclosed by a cover glass.

germicidal effectiveness: See *bactericidal effectiveness.*

germicidal efficiency of radiant flux: See *bactericidal efficiency of radiant flux.*

germicidal exposure: See *bactericidal exposure.*

germicidal flux and flux density: See *bactericidal flux and flux density.*

germicidal lamp: a low pressure mercury lamp in which the envelope has high transmittance for 254-nanometer radiation. See *bactericidal lamp.*

glare: the sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted to cause annoyance, discomfort, or loss in visual performance and visibility. See *blinding glare, direct glare, disability glare, discomfort glare.*

NOTE: The magnitude of the sensation of glare depends upon such factors as the size, position and luminance of a source, the number of sources and the luminance to which the eyes are adapted.

globe: a transparent or diffusing enclosure intended to protect a lamp, to diffuse and redirect its light, or to change the color of the light.

glossmeter: an instrument for measuring gloss as a function of the directionally selective reflecting properties of a material in angles near to and including the direction giving specular reflection.

glow discharge: an electric discharge characterized by a low, approximately constant, current density at the cathode, low cathode temperature, and a high, approximately constant, voltage drop.

glow factor: a measure of the visible light response of a fluorescent material to "black light." It is equal to π* times the luminance in candelas per square meter produced on the material divided by the in-

*π is omitted when the luminance is in footlamberts and flux density is in milliwatts per square foot.

the incident flux leaves a surface or medium from the incident side, without change in frequency.

NOTE: Reflection is usually a combination of regular and diffuse reflection. See *regular (specular) reflection, diffuse reflection and veiling reflection.*

reflectivity: reflectance of a layer of a material of such a thickness that there is no change of reflectance with increase in thickness.

reflectometer: a photometer for measuring reflectance.

NOTE: Reflectometers may be visual or physical instruments.

reflector: a device used to redirect the luminous flux from a source by the process of reflection. See *retroreflector.*

reflector lamp: an incandescent filament or electric discharge lamp in which the outer blown glass bulb is coated with a reflecting material so as to direct the light (*e.g.*, R- or ER-type lamps). The light transmitting region may be clear, frosted, patterned or phosphor coated.

reflex reflector: See *retro-reflector.*

refraction: the process by which the direction of a ray of light changes as it passes obliquely from one medium to another in which its speed is different.

refractor: a device used to redirect the luminous flux from a source, primarily by the process of refraction

regions of electromagnetic spectrum: for convenience of reference the electromagnetic spectrum is arbitrarily divided as follows:

Vacuum ultraviolet	
Extreme ultraviolet	10–100 nm
Far ultraviolet	100–200 nm
Middle ultraviolet	200–300 nm
Near ultraviolet	300–380 nm
Visible	380–770 nm
Near (short wavelength) infrared	770–1400 nm
Intermediate infrared	1400–5000 nm
Far (long wavelength) infrared	5000–1,000,000 nm

NOTE: The spectral limits indicated above have been chosen as a matter of practical convenience. There is a gradual transition from region to region without sharp delineation. Also, the division of the spectrum is not unique. In various fields of science the classifications may differ due to the phenomena of interest.

regressed luminaire: a luminaire mounted above the ceiling with the opening of the luminaire above the ceiling line. See *flush-mounted, surface-mounted, suspended* and *troffer.*

regular (specular) reflectance: the ratio of the flux leaving a surface or medium by regular (specular) reflection to the incident flux. See *regular (specular) reflection.*

regular (specular) reflection: that process by which incident flux is re-directed at the specular angle. See *specular angle.*

regular transmission: that process by which incident flux passes through a surface or medium without scattering. See *regular transmittance.*

regular transmittance: the ratio of the regularly transmitted flux leaving a surface or medium to the incident flux.

relative contrast sensitivity RCS: the relation between the reciprocal of the luminous contrast of a task at visibility threshold and the background luminance expressed as a percentage of the value obtained under a very high level of diffuse task illumination.

relative erythemal factor: See *erythemal efficiency of radiant flux.*

relative luminosity: previously used term for *spectral luminous efficiency of radiant flux.*

relative luminosity factor: previously used term for *spectral luminous efficiency of radiant flux.*

resolving power: the ability of the eye to perceive the individual elements of a grating or any other periodic pattern with parallel elements. It is measured by the number of cycles per degree that can be resolved. The resolution threshold is the period of the pattern that can be just resolved. Visual acuity, in such a case, is the reciprocal of one-half of the period expressed in minutes. The resolution threshold for a pair of points or lines is the distance between them when they can just be distinguished as two, not one, expressed in minutes of arc.

resultant color shift: the difference between the perceived color of an object illuminated by a test source and that of the same object illuminated by the reference source, taking account of the state of chromatic adaptation in each case; *i.e.*, the resultant of colorimetric shift and adaptive color shift.

retina: a membrane lining the more posterior part of the inside of the eye. It comprises photoreceptors (cones and rods) that are sensitive to light and nerve cells that transmit to the optic nerve the responses of the receptor elements.

retro-reflector (reflex reflector): a device designed to reflect light in a direction close to that at which it is incident, whatever the angle of incidence.

rhythmic light: a light, when observed from a fixed point, having a luminous intensity that changes periodically. See *equal interval light, flashing light, group flashing light, interrupted quick-flashing light, quick flashing light, occulting light.*

ribbon filament lamp: an incandescent lamp in which the luminous element is a tungsten ribbon.

NOTE: This type of lamp is often used as a standard in pyrometry and radiometry.

rods: retinal receptors which respond at low levels of luminance even down below the threshold for cones. At these levels there is no basis for perceiving differences in hue and saturation. No rods are found in the center of the fovea.

room cavity: the cavity formed by the plane of the luminaires, the work-plane, and the wall surfaces between these two planes.

room cavity ratio, RCR: a number indicating room cavity proportions calculated from length, width and height. See Section 9.

room index: a letter designation for a range of room ratios.

room ratio: a number indicating room proportions,

EXHIBIT C

IES LIGHTING HANDBOOK

1987 Application Volume

JOHN E. KAUFMAN, PE, FIES
Editor

JACK F. CHRISTENSEN
Associate Editor

Published by
ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA
345 East 47th Street, New York, N. Y. 10017

ISBN 0-87995-024-2
Library of Congress Catalog Card Number: 86-082876

Second printing: February, 1989

PRINTED IN THE UNITED STATES OF AMERICA

by patient or nurse; however, when left on continuously, the luminance produced in the surrounding field of darkness is sometimes a source of annoyance to patients wishing to sleep.

For continuous use, the night-light recommended incorporates a low-brightness luminaire with louvered or refractive cover, flush wall type, installed so that its center is approximately 360 millimeters (14 inches) above the floor to direct a low illuminance along the floor where it is needed for walking or moving about in the room.

The important criterion for night lighting is limiting the source luminance. This luminance should not exceed 70 candelas per square meter (6.5 candelas per square foot) for continuous use, or 200 candelas per square meter (19 candelas per square foot) for a short time.

Examination. The lighting for examining patients in their rooms should be of a color quality that will not distort skin or tissue color, of a directionality to permit careful inspection of surfaces and cavities, and shadowless. When curtains are used to isolate a patient, others in the room are protected from the examining lamp; however, whether fixed or portable, the examination lighting should be confined to the bed area and provide adequate lighting in the center of a circular area 0.6 meter (2 feet) in diameter.

Examination lights are defined as those luminaires used for minor medical procedures outside the operating room. Examples of these procedures would be tissue examination and suture removal. The range of examination/treatment units varies from a simple "gooseneck" lamp to a luminaire having qualities similar to an operating room unit, depending on the complexity and nature of the visual task. The following criteria should be considered when selecting luminaires for examination:

1. *Distance:* adequate illumination should be available at a distance of 1070 millimeters (42 inches). In treatment rooms, the focal length of the luminaire should be compatible with the task to be observed, typically 600 to 910 millimeters (24 to 36 inches).
2. *Radiation:* for patient safety and comfort, the luminaire should be designed with a heat filtration system. At maximum intensity, the lighting unit at a distance of 1060 millimeters (42 inches) from the field should produce no more than 25,000 microwatts per square centimeter in the field.
3. *Color Correction:* the luminaire should provide good color rendition of tissue. Color temperature should be between 3500 and 6700 kelvins.
4. *Mobility:* the unit should move freely and be easily positioned with one hand. Once the luminaire is positioned, the mounting system should permit it to remain stationary without drifting. Articulation of the unit should require 2.3 kilograms [five pounds] or less of force by the user.
5. *Safety:* safety of the user and patient should be addressed by considering (a) surface temperatures of the luminaire, (b) tipping-hazard, (c) electrical safety, and (d) durability of external surfaces. The placement of fixed, flexible arm units should be reviewed carefully, especially with older patients who may reach out to use the arm for support, which it will not provide.

Patient Use. Patient use implies control by the patient for reading, visiting, self-care or viewing television. This control must be limited to

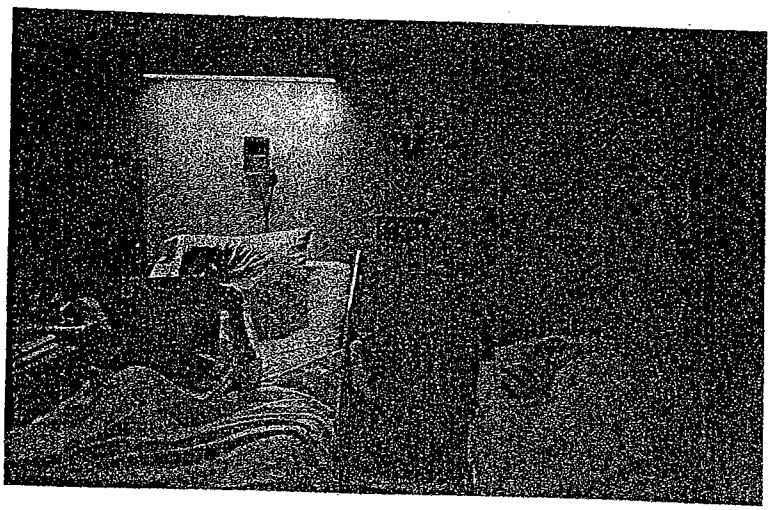


Fig. 7-6. Patient room lighting in multiple occupancy accommodation. Note one patient reading while another sleeps under reduced illumination.

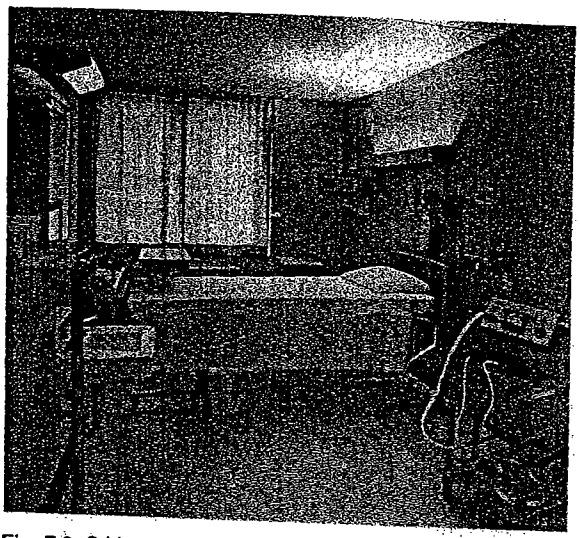


Fig. 7-8. Critical care room. Wall brackets contain two fluorescent lamps for indirect general lighting, one fluorescent lamp as a downlight for reading, and an incandescent night-light for surveillance from the nurses' station. Two 325-watt tungsten halogen lamps in ellipsoidal reflectors are also provided for indirect examination light.

port resuscitation, hemorrhage, or any other anticipated emergency situations which can be anticipated.

The illumination should enable the observer to note (1) changes in contour and color, (2) the prominence of veins on the neck, and (3) the presence of yellow tints in the patients' eyes, if possible. Good color rendering is important so that the patients' complexion will have a true appearance. Thus, only improved color fluorescent lamps should be used. See Fig. 7-8.

While the demands for visual tasks in these units may be great, the well-being of the patient must also be carefully considered in planning. For example, the minimum requirements of construction from the Health Resources Administration (*79-1450*) require the provision of windows to enable *each* patient to be cognizant of the outdoor environment. Yet the provision of illumination by this means is not important.

The general lighting should be capable of being dimmed. It should be located so that neither the prone patient, nor the one sitting with an elevated backrest, will be subjected to glare. In addition to general lighting, there should be lighting for examinations by the physician. Also, some type of surgical task light should be readily available to provide higher illuminances for emergency procedures.

Most of these facilities contain a handwashing area.

The nursing station is usually fully visible to the patient, so that luminaires below the counter or shelf should be shielded.

Monitoring devices (see Fig 7-9) should be studied so that there will be adequate illumination for reading them. This also includes a review of their placement and whether or not they are internally illuminated.

Children's Section (Pediatric). The child admitted to the hospital for the first time may feel dwarfed by its huge size and depressed by the concentration of suffering. Strange equipment may be frightening and may alarm ill patients or intensify anxiety. For this reason the pediatric section or department should be provided with

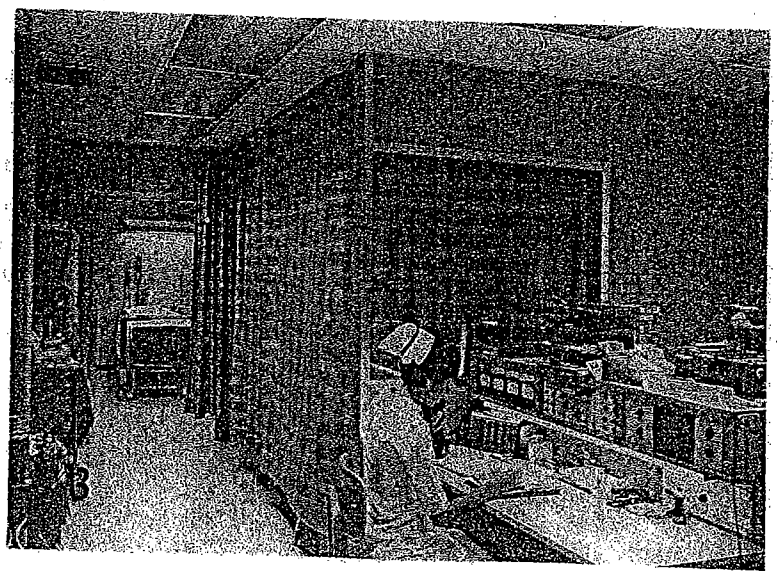


Fig. 7-9. Nursing station in critical care unit. Note the lighting beneath the counter and out of the patient's view. Also, monitoring devices are easily visible.

EXHIBIT D

8TH EDITION

LIGHTING HANDBOOK

REFERENCE & APPLICATION

MARK S. REA, PH.D. FIES
EDITOR-IN-CHIEF
RENSSELAER POLYTECHNIC INSTITUTE

ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA
NEW YORK

Managing Editor: Judith Block
Production Manager: Judith Block
Editorial Assistant: John Bullough
Copyeditor: Joseph C. Fineman
Illustrators: Bruce Kaiser and DeWitt Gorman
Indexer: Robert J. Richardson
Typesetting and graphics: Science Typographers, Inc.
Marketing: Beth Bay
Cover design: Tony Picco

LIGHTING HANDBOOK, Eighth Edition

ISBN 0-87995-102-8

Library of Congress Catalog Card Number: 93-78569

Printed in the United States of America.

The Illuminating Engineering Society of North America welcomes your comments. Please send all correspondence to:

Publications Department
IESNA
120 Wall Street, 17th Floor
New York, NY 10005

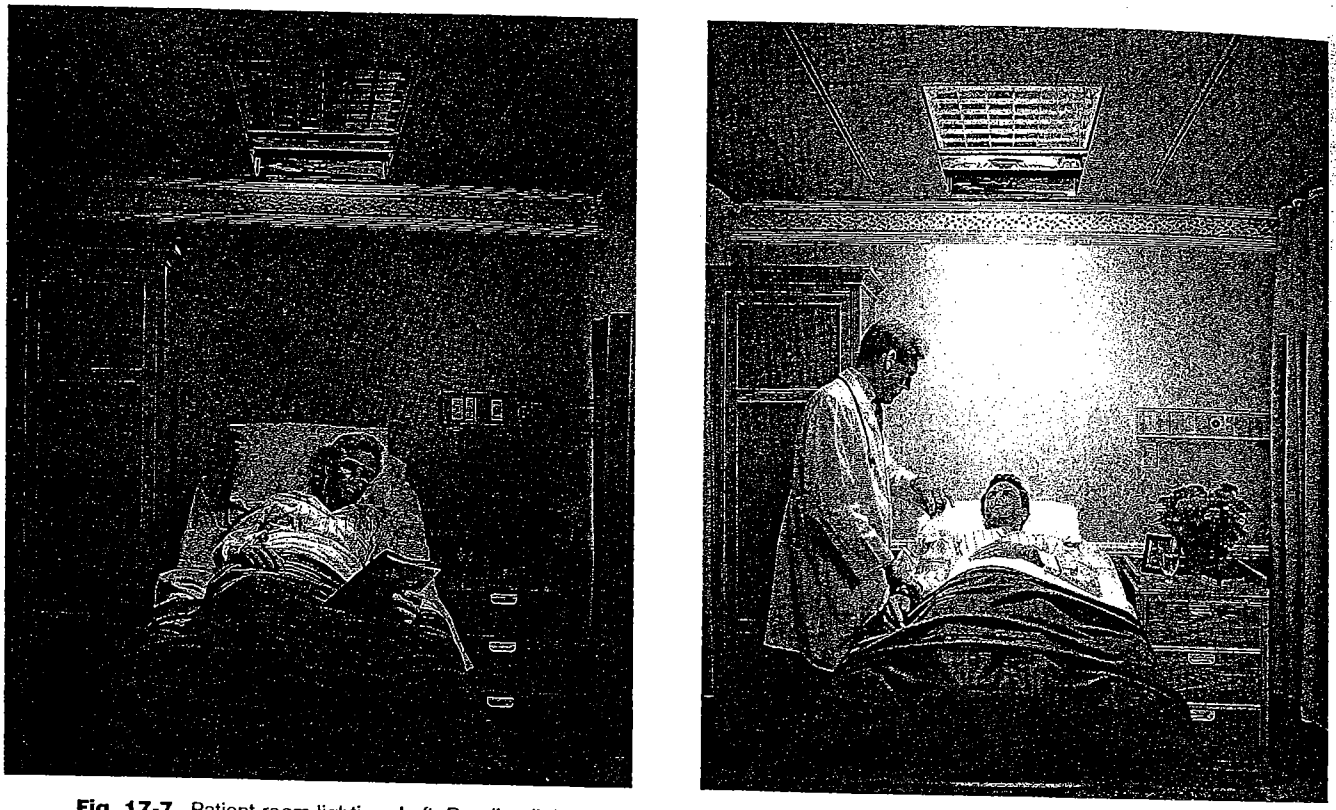


Fig. 17-7. Patient room lighting. Left: Reading light, which positions light directly onto the patient's reading material with no reflected glare. Right: Examination light, which can be controlled with a wall switch by hospital staff, utilizes compact fluorescent lamps for excellent color rendition.

lighting, should be at least equal to the illuminance in $1/p$ lux on the reading matter.

The luminance of the reading lamp and of any surface illuminated by it, as seen from the patient's bed or any normal reading position, should be less than 310 cd/m^2 (30 cd/ft^2). This condition is admittedly difficult to satisfy and entails a careful choice of luminaire and built-in limitations to its movement. See figure 17-7.

Housekeeping. A very important consideration is the lighting for housekeeping functions. Housekeepers need to see dust or dirt to remove it, including that beneath the furniture. Oblique lighting should be provided over horizontal surfaces to observe dust.

Nursing Stations. In most hospitals a nursing unit is coordinated around a nursing station (see figure 17-8). Here charts are stored, read and written. A desk or shelf is invariably provided, usually against some type of counter or below a hung cabinet. Lighting mounted beneath this counter should provide for the task. It should be so arranged that it supplements the overall illumination of the station.

Some of this lighting will be in continuous use, night and day, and this should be considered in the lighting plan for the station. Usually, although by no means universally, when the nursing station is not visible from any of the patient accommodations, general ceiling

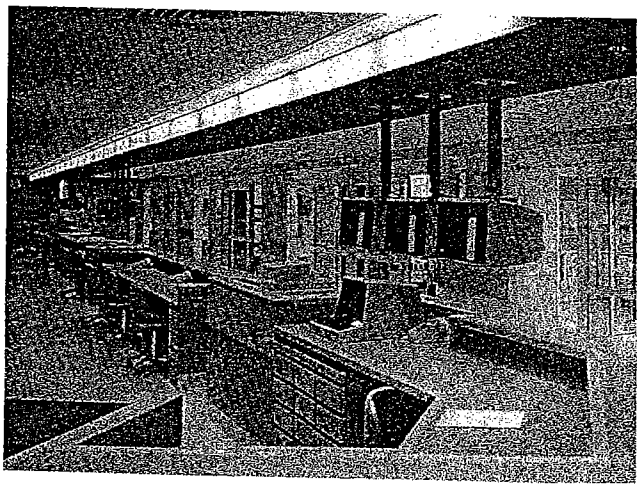


Fig. 17-8. Lighting at a nurses' station is multilevel, to allow for a higher illumination during the day and a lower level at night. The lighting is designed to allow for the critical task of reading patient information from the computer screen. Undercounter task lights also function as night lights.

sources remain lighted during the night hours. Also the luminaires beneath counters, placed so that a person sitting at the desk is shielded from glare, should not be within the patient's direct view.

As the nurse must make frequent trips from the station to patient's rooms as well as to service loca-

EXHIBIT J
TO EXPERT DECLARATION
OF THOMAS M. LEMONS

UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

GENLYTE THOMAS GROUP LLC A Delaware Limited Liability Company Plaintiff, v. ARCHITECTURAL LIGHTING SYSTEMS a division of ARCH LIGHTING GROUP a Rhode Island Corporation Defendant	)	Civil Action No. 05-CV-10945 REK

REBUTTAL
STATEMENT OF THOMAS M. LEMONS

INTRODUCTION

I have been asked by the Attorney for the Plaintiff to review and comment on the Architectural Lighting Systems (ALS) "Markman" Statement dated May 17, 2006.

QUALIFICATIONS

My qualifications have been previously detailed in my statement of May 18, 2006. My rate of compensation paid by Genlyte for my services is $140 per hour and I have not yet received compensation for my ALS activity.

MATERIALS CONSIDERED IN FORMING MY OPINION

The materials that I considered while forming my opinion are as follows:

ALS "Markman" statement dated May 18, 2006 with attachments:
- Statement of Ian Lewin dated May 16, 2006
- U. S. Patent # 5,038,254 ('254)
- IESNA Lighting Handbook, 8th Edition, 1993, pages 463, 438, 440 & 917
- U. S. Patent # 2,557,129 ('129)
- U. S. Patent # 4,816,969 ('969)

Statement of Thomas M. Lemons dated May 18, 2006
IESNA Lighting Handbook, Reference Volume, 1984
IES Lighting Handbook, 3rd Edition, 1959

Conwed Ceiling Products, 1975 brochure
Sorcar, P. C., *Rapid Lighting Design and Cost Estimating,* McGraw-Hill Book, Co., New York, NY, 1979
Elmer, W. B., *Optical Design of Reflectors*, John Wiley and Sons, 1980, Fig. 9j, p. 29

REVIEW

1. On pages 5 and 6 of the ALS Statement (Exhibit A), under the heading "*Means for Ceiling-Mounting Said Body*" they address this phrase as a 112/6 means plus function phrase. ALS totally misses the fact that the patent at Column 1 line 5 states "preferably mounted in the ceiling." Further the '254 patent at Column 3 starting at line 12 states "lighting fixture 10 to be packaged in a two foot by four foot configuration and thereby replace a conventional troffer." The IESNA Lighting Handbook, Reference Volume, 1984 (Exhibit B; the Handbook current at the filing time of in 1990 of the '254 patent) defines "troffer" as "a recessed lighting unit, usually long and installed with the opening flush with the ceiling." This exact same definition was in the IESNA Lighting Handbook, 3rd Edition, 1959 (Exhibit C) which indicates that "troffer" has been a lighting term for at least 50 years and is therefore well understood by everyone in the lighting industry including how they mount into the ceiling. A replacement for a "conventional troffer" immediately tells a person in the lighting industry how the unit is mounted. No detailed description is required because a "troffer" lies on a lip around an opening in a grid ceiling where it replaces the acoustical tile that would otherwise lay into the openings of the ceiling grid (see Exhibit D for a typical grid ceiling). The "conventional troffer" body sizes, face lip configuration and mounting are illustrated in the book *Rapid Lighting Design and Cost Estimating* published in 1979 (Exhibit E). It illustrates sizes of 1 by 4, 2 by 2 and 2 by 4; face lip configuration of an outward bent "U" shape (Exhibit E, pp. B-2, B-16 and B-20), a vertical edge (Exhibit E, p. B-42) or an inward bent lip (Exhibit E, p. B-34) with their mounting (Exhibit E, p. B-52). The '254 patent description of Figure 2 located in Column 2, starting at line 34 states "lighting fixture 10 formed by long sides 12, 14 and short sides 16, 18. Long sides 12, 14 are typically four feet in length while short sides 16, 18 are typically two feet in length." The Figure 2 illustration shows the face view of a troffer with a vertical lip and as illustrated by Exhibit E, p. B-52, no additional elements are required for mounting a troffer into a ceiling. As illustrated by Exhibit E, p. A-38 and C-22, the surface and suspended mounting of luminaires requires holes in the body related to junction boxes and holes for suspension mounting but these are not the preferred mounting identified in the '254 patent. Therefore the ALS identification in the middle paragraph on page 6 that the "recited function is mounting the body on the ceiling" is incorrect as is their claim that the means for mounting are not identified in the '254 patent. It is true that many troffers that are 2 x 2 and 2 x 4 are also made in a second construction to allow surface mounting and therefore both recessed and surface mounting should be accepted mounting means for a '254 patent device but details for both are not required to be in the '254 patent.

2. On pages 6 and 7, under the heading 2. *Oriented to direct light* of Exhibit A, ALS uses Dr. Lewin to define "directing light". ALS states "Light from any fixture is dispersed in many directions." Dr. Lewin also uses the IESNA definition of "downward component"

when he discusses the meaning of the term "downwardly" and the meaning is "the portion of luminous flux from a luminaire emitted at angles below the horizontal." (A angular width of 180°.) Therefore the phrase "oriented to direct light" does not suggest the aiming of a flashlight as suggested by Dr. Lewin. We should therefore conclude the following:

1. Lamps and luminaires (light fixtures) produce light in many directions and not to a single point or target.

2. The distribution of light from lamps and luminaires is three-dimensional where light can go downwardly, outwardly and/or upwardly.

The issue is light being directed below the horizontal and not above the horizontal. There is nothing in the patent that identifies that any of the three fixtures produce "flashlight" or even "spotlight" beams of light. Even the reading light is said in Column 2 starting at line 4 "to direct light to the forward portion of the patient's bed" and therefore an area much bigger than the area illuminated by a "flashlight" or "spotlight". Therefore it is incorrect to conclude that there is a specific "target" where "the majority of the light" or "the part having the highest intensity" is directed. For instance, the reading light may have a maximum intensity directed to a specific location but the light in this area will be only a small portion of the total light produced by the lamps rather than the majority of the light from the lamps. Further ALS states in the middle of page 7 "If claim 1 were interpreted so as not to be limited to the highest intensity light being aimed in the direction towards the recited target, the claim would be invalid." They provide no proof of this and there is no such statement of this type in the patent with the exception of the need to direct light downwardly and not upwardly.

3. On page 8, under the headings 4. *A Selected Reading Area* and 5. *Second Light Fixture – Oriented to Direct Light* of Exhibit A, ALS again uses Lewin to define these two phrases to mean "the majority of light or the highest intensity light is aimed in a given direction." As noted above, the reading area will not have the majority of the light and there is no specific point on a bed were a patient reads so there can be no specific point or direction for aiming the highest intensity. The patent only states that this is "downwardly to a selected reading area under said body" at Column 3, line 41 and 42. Lewin's meaning should therefore not be accepted.

4. On pages 8 and 9, under the heading 6. *Downwardly and outwardly* of Exhibit A, ALS again wants to limit the meaning of this claim. I suggest that the claim can be read to state "a second light fixture within said body oriented to direct light downwardly (to a broad area under said body) and outwardly to a vertical wall surface outwardly adjacent from said body whereby light is reflected back to a broad area under said body." This reading says the light is directed to both the area under the body as well as to the wall adjacent to the body. There is no statement anywhere in the patent which states that only the wall should be illuminated and no light should be directed elsewhere. Further, there is no statement in the patent that there is a maximum intensity of light from any fixture and that it or a majority of light is directed to a specific point. I would also note that these requirements are almost impossible to accomplish using the long linear Biax lamp. In fact in Column 2, starting a line 58 it is recognized that light is going directly down onto the bed and to areas beside the bed by stating "Reflectors 20, 24 and bulbs 22, 26 are

configured so as not to direct glare toward the head of bed 200 where the patient's head is likely to be...and...not to direct glare to areas adjacent to bed 200". The light distribution of the "second light fixture" of the '254 patent is stated to be "downwardly and outwardly". Persons skilled in the lighting art understand this to mean that some light will necessarily be directed from the luminaire to a wall surface outwardly adjacent to the fixture. Therefore the ALS position supported by Dr. Lewin is that there is only one direction for the light which is both downward and outward to the adjacent wall and I believe that this is an attempt to narrow the actual meaning of the claim and their proposed meaning is not supported by the information in the patent.

5. On pages 11 and 12, under the heading 1. *Reflector* of Exhibit A, ALS, using incorrect information from Dr. Lewin, tries to again limit the patent claims. Dr. Lewin states that the reflector material must be "specular or semi-specular" material to obtain beam control of the directed beams. The facts are that a specular or mirror image of the Biax lamp in the plane of the lamp will produce a light distribution identical to the light distribution at the lamps surface. The surface of the lamp has a lambertian distribution (defined by IESNA "a surface that emits or reflects light in accordance with Lambert's cosine law" i.e. a wide distribution, see Exhibit B). The semi-specular material will spread this wide distribution into a wider distribution. The white paint diffuse surface as shown in Figure 9j of Exhibit F, reflects light with a Lambertian distribution plus a specular source image. White painted reflectors are the most common reflector material used in troffer luminaires since they can provide over 90 % reflection and they can help control glare by becoming a large area with a uniform brightness. Therefore there is no basis to say that specular or semi-specular reflector material will, by their nature, produce better control of light than a white painted reflector and there is no reason to state that specular and semi-specular reflectors are necessary.

6. On page 12, under the heading 4. *Glare* of Exhibit A, ALS again tries to limit claims 13 and 14 by misrepresenting the meaning of glare. Glare has several factors that must be considered to understand how glare is controlled. The adaptation of the viewer's eyes is one key element. For instance, in the daytime automobile headlights are not glare sources for oncoming drivers but they can be at night when a person is dark adapted. The brightness of the source is another factor as is the area of the brightness and it location in the line of vision or off axis. A large area with uniform brightness such as the area of the luminaire and an adjacent illuminated wall can easily be considered to not be a glare source whereas a spotlight in a dark ceiling with little light on the wall (such as illustrated by U. S. Patent # 2,557,129, Exhibit C to Lewin's Statement) will be a glare source. This has nothing to do with directing the highest intensity of light to a specific target area and to have a sufficiently low intensity directed to other areas. The spotlight that easily meets these criteria will still be a glare source to a neighbors bed where the patient is looking up and over to the spotlight in the ceiling because there is a bright glow at the spotlight and the rest of the room in the field of view is dark.

7. In the statement of Ian Lewin on page 2 (Exhibit 2 to the ALS Statement (Exhibit A)), the term "*to direct light*" is defined to mean "to aim the highest intensity of light". Some beam patterns have a fairly uniform intensity of light over a range of angles such as

illustrated by luminaires # 32, # 34 and # 36 of Exhibit E to the Lewin statement; luminaires # 43 and # 48 of Exhibit F to the Lewin Statement; and luminaires # 40, # 41 and # 42 of Exhibit G to the Lewin statement. Lewin does not address how it is possible to "aim" a luminaire where the highest intensity ranges over a wide range of angles. In fact, one skilled in the art understands that spotlights and flashlights are aimed at a point but wide beams are only directed in general directions such as downward, outward or upward. Also when beams are directed to limit light beyond a given angle such as no up light or light above 90°, the luminaire is directed by the angle where there is no light beyond that angle and not by where the maximum intensity occurs. Lewin's meaning should not be accepted because there is nothing in the patent to suggest such a need for aiming the light fixtures and the acceptance of this meaning narrows the meaning of the claims.

8. In the statement of Ian Lewin on page 2 (Exhibit 2 to the ALS Statement (Exhibit A)), the term "*downwardly*" is defined using the phrase "downward component" from the IESNA Glossary of Lighting Terminology in the IESNA Lighting Handbook, 8th Edition published in 1993. I would note that this is an incorrect reference for a 1990 filed patent and though the definition did not change, the correct reference should be the IESNA Lighting Handbook, Refernenc Volume, 1984.

9. Lewin's statements starting on page 2 (Exhibit 2 to the ALS Statement (Exhibit A)) related to the term "*to a select reading area on or above the bed*" provides a strange meaning for the term. It says "to a reading area on or above the bed" which identifies that there is a very large area where Lewin states the maximum intensity should be aimed versus his "*purposeful directing of the highest intensity of light towards a target*". Again we see that his definitions are an attempt to limit the meaning of claims without having a basis for the limitation and therefore his meaning should not be accepted.

10. On page 3 of Lewin's Statement (Exhibit 2 to the ALS Statement (Exhibit A)), Lewin defines the term "*downwardly and outwardly to a vertical wall surface*" to mean "a single direction below and outwards from the fixture so as to illuminate a vertical wall surface". As indicated in paragraph 4 above, this meaning has no basis for support within the patent which in fact identifies that the wall, bed and area beside the bed will be illuminated and not just the wall. Again this single direction meaning is only proposed to limit the meaning of the claim with no evidence from the patent that such a narrow meaning is justified. The paragraph that starts at the bottom of page 3 and ends at the top at page 4 also contains erroneous information. First, the intensity of light directed onto the wall must be properly controlled since the highest intensity cannot be directed at the top of the wall but should be directed at the bottom of the wall to achieve the most uniform distribution of illumination on the wall. It is the uniformity of illumination on the wall that limits the wall from becoming a glare source since a very bright area at the top of the wall that is adjacent to the luminaire could be a source of glare. Secondly, if the wall is uniformly illuminated, this large area helps establish the viewer's adaptation which will allow more light to be directed at the eye. The patient therefore does not require only a low intensity of light. Further erroneous information is provided in the first paragraph on page 4. To achieve uniform illumination down a wall, and with the bed

located adjacent to the wall, the maximum intensity that illuminates the wall will also illuminate the head of the bed since the optics to have an absolute cutoff of light at this location is not easily achieved or required. It is the uniformity of the wall illumination that makes the results "effective". Such effective illumination is rarely "efficient" which would require that more light must be directed onto the wall than is directed to any other location. These facts are well known in the art and the suggestion by Lewin that efficient cutoff optics are required without this ever being stated in the patent is only meant to limit the meaning of the claims. The meaning provided by Lewin should therefore not be accepted.

11. On page 5 of Lewin's Statement (Exhibit 2 to the ALS Statement (Exhibit A)), Lewin again suggests that the third fixture also has one selected "patient examination area". He then states that this is the "an area on or above the bed" which I would understand to be at least a 3 x 6 x 3 foot or 54 cubic foot space that I do not believe provides "a" location to direct the highest intensity of illumination. The concept of directing the highest intensity of illumination therefore again fails and Lewin's meaning should not be accepted.

12. Starting at the bullet at the middle of page 5 of Lewin's Statement (Exhibit 2 to the ALS Statement (Exhibit A)), Lewin identifies "hundreds of commercial lighting products are available for general lighting or 'ambient' lighting". This fact is not in dispute but the patent was granted for a device that was unique by its "integration" of two or three specific lighting fixtures that could be similar to individual standard commercial lighting fixtures. Their "integration" into one body is only one aspect of the invention. Their "integration" is no basis for Lewin to identify reasons to limit their claim language.

13. On page 6 of Lewin's Statement (Exhibit 2 to the ALS Statement (Exhibit A)), Lewin defines the term "*reflector*" without using the accepted definition provided by the IESNA which is the source he uses for other terms. He again provides a definition that would limit the meaning of the claims where the term is used in an attempt to limit their meaning. As I indicated in Paragraph 5 above, the addition of "semi-specular or specular reflector surfaces" is based on no fact or concept of the control of light identified in the patent. I do not believe that anyone skilled in the art would agree with Lewin's suggested definition as compared to the IESNA industry accepted definition which I provided in my report filed with Genlyte's Opening "Markman" Statement. The Lewin definition should not be accepted.

14. On page 6 of Lewin's Statement (Exhibit 2 to the ALS Statement (Exhibit A)), Lewin again provides a claim limiting definition of the term "*a light distribution pattern*". A biax fluorescent lamp directs light in every three dimensional direction except there is no light through the socket end of the lamp. For the side that is normal to the two tubes of light, the light intensity is about twice that of the intensity of light that is normal to a side that sees only one tube. The proposed meaning ("The direction[s] where the major intensity of light is projected.") would therefore seem to suggest that only the light directed by the sides of the lamp where the two tubes produce the greatest intensity or major intensity is being considered. This definition does not recognize that the lamp's

distribution pattern includes a great range of intensity values including one direction along the lamp axis where the intensity is zero. Lewin's definition therefore cannot be accepted and the definition I proposed in my report, filed with Genlyte's Opening "Markman" Statement, should be accepted.

15. On page 7 of Lewin's Statement (Exhibit 2 to the ALS Statement (Exhibit A)), Lewin has identified two patents that he considers prior art. The first, the '129 patent, is a ceiling mounted spotlight proposed "for attachment to a suspended or ceiling type fixture". The '254 patent details the installation of two or three very specific light fixtures which are contained within a common body rather than attached to each other and none of the '254 patent fixtures are "spotlights". There is no suggestion in the '129 patent that this fixture would apply to a hospital patient room lighting. When I look at the IESNA Lighting Handbooks starting with the 3rd Edition published in 1959 through the 1987 Application Volume, I find no illustrations of ceiling mounted spotlights being used in patient room lighting. The reason for this, as I discussed in paragraph 6 above, is the glare seen by patients in adjoining beds. There have been such products proposed and installed in patient rooms but they have never been found to provide acceptable results. Ceiling mounted spotlights therefore are not an accepted means to provide the reading light, the ambient light or examination light in a hospital patient room.

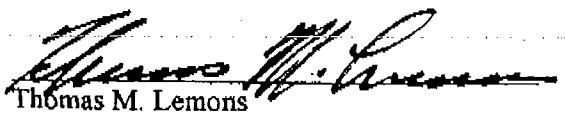
The '969 patent illustrates one of the many standard wall mounted "bed" lights used in the industry prior to the introduction of Genlyte products made in accordance to the '254 patent. As identified by the IESNA Lighting Handbook, 8th Edition published in 1993, the Genlyte fixture is illustrated in Figure 17-7 (Exhibit G) as the method used to illuminate a patient room. This means that within two years of the introduction of this product, it became the standard for the industry and replaced the wall mounted bed light that was illustrated in the IESNA Lighting Handbook, Applications Volume, 1987 Figures 7-6 and 7-8, Exhibit H. A similar bed light was illustrated in the IESNA Lighting Handbook, 3rd Edition from 1959 which indicates that such a wall mounted product had been in existence for many years. The suggestion by Lewin that the '969 patent product would be an acceptable product when mounted on the ceiling is absurd. There are two lamp/reflector/lens compartments. One with fluorescent lamps 47, reflector 43 and lens 41 provides down light for reading. The second with a rotating tube to direct light from just below horizontal to almost straight up has fluorescent lamps 68, the inner surface of the half tubular housing 11 as the reflector and a lens 71. The angular rotation available will not allow it to be rotated down far enough to become a reading light and since it provides a wide beam distribution it would not direct light from the ceiling to the reading area. If this luminaire was mounted "on" the ceiling by using the angle brackets suggested by Lewin and the lens 41 changed to a bilateral lens also suggested by Lewin, light would be directed onto the wall and out into the room while limiting light down onto the bed. The light out into the room will then be a glare source for nurses, doctors and adjacent patients. The second light will direct much of its light onto the ceiling rather than providing the light needed as an "examination" or "reading" light due to the limited rotation of the tubular housing. It will also produce glare for nurses, doctors and adjacent patients. Since the junction box for this product is exposed rather that mating with the junction box in the wall for it normal installation or a ceiling junction box for normal

ceiling mounted fixture, the ceiling mounting using "a pair of L-shaped brackets" is probably not an acceptable code mounting method. For these reasons, Lewin's suggestion that this product is prior art for the '254 patent should not be accepted..

CONCLUSION

A majority of the ALS proposed meanings for the terms of the '254 patient are meanings that limit the scope of the claims and ALS has not provided a basis identified in the patent for the limitation. The basis which is provided for the limitations is that Lewin says that he represents a person skilled in the lighting arts and such a person would add these limitations. I do not find anything in the material that he has provided that indicates that he has the knowledge and experience in the medical lighting industry to claim an expertise in that lighting field. I further believe that his terms' meanings support this conclusion. Further he identifies that he cannot reverse engineer the performance of the Genlyte products illustrated by the '254 patent to understand how they perform or reverse engineer the performance of the '129 and '969 patents to understand their performance when ceiling mounted in a hospital patient room. For these reasons, I do not believe that his term meanings should be considered.

Executed this 5th day of June, 2006.



Thomas M. Lemons
TLA-Lighting Consultants, Inc.
7 Pond Street, Salem, MA 01970

EXHIBIT A
TO REBUTTAL STATEMENT
OF THOMAS LEMONS

UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

GENLYTE THOMAS GROUP LLC, Plaintiff/Counterclaim Defendant, v. ARCHITECTURAL LIGHTING SYSTEMS, a division of ARCH LIGHTING GROUP, Defendant/Counterclaimant.	Civil Action No. 05-CV-10945 REK

DEFENDANT'S MARKMAN STATEMENT

Pursuant to agreement of the parties and in preparation for the "Markman" hearing scheduled by the court, Defendant, Arch Lighting Group, Inc. (ALS), submits this statement setting forth the appropriate interpretation of the claims of U.S. Patent No. 5,038,254 ("the '254 patent"). A copy of the '254 patent is attached hereto as Exhibit 1.

I. BACKGROUND

Plaintiff Genlyte Thomas Group, LLC ("Genlyte") and ALS are both in the business of designing, manufacturing, marketing and selling lighting fixtures. With respect to the present action, both Genlyte and ALS sell a multifunction lighting fixture for hospital patient rooms. The lighting fixtures from both companies include separately controllable lights within the fixture to provide lighting for different needs within a hospital room. The needs relate to lighting levels at different locations in a hospital room. In particular, the fixtures provide ambient lighting to the room, lighting for a patient to read, lighting for a doctor to examine the patient, and lighting for a nurse to view a chart without disturbing the patient.

Genlyte began selling its medical lighting fixture in approximately 1991 When ALS developed its product, approximately ten years later, it was well aware of the Genlyte product and that Genlyte had various intellectual property rights relating to its products. Accordingly, ALS designed its lighting fixture so as to differ significantly from the Genlyte product while still providing the functions necessary for a hospital room light. Thus, the ALS product uses different bulbs, different bulb orientations, different reflectors, and different lenses than Genlyte's product. The differences designed into the ALS product provide different light distributions from those in Genlyte's product for each function of the lighting fixture.

The claims of the '254 patent recite the structures and light distributions found in Genlyte's product. Despite the differences between the ALS and Genlyte products, Genlyte asserted that the ALS was infringing the '254 patent. ALS denied infringement and provided one of its products to Genlyte for testing. The testing showed that all of the lights in the ALS product have a similar light distribution pattern, while the claims of the '254 patent require differently directed lights, as discussed below. Nevertheless, Genlyte maintained its clearly unsupported assertion of infringement and filed the present action.

II. LEGAL STANDARDS FOR CLAIM INTERPRETATION

Patent infringement is a two step process. First, the Court must determine the meaning of the claims. *Markman v. Westview Inst. Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995)(en banc), *aff'd* 517 U.S. 370 (1996). Second, the claims, as interpreted, are compared to the accused product to determine infringement. *Allen Eng'g Corp. v. Bartell Indus. Inc.*, 299 F.3d 1336, 1345 (Fed. Cir. 2002). The claim interpretation step is a legal question to be decided by the Court. *Markman*, 52 F.3d at 977. The claims are to interpreted on an objective basis as they would be understood by one of ordinary skill in the art at the time the invention. *Markman*, 52 F.3d at 986.

The starting point for claim construction is always the language of the claims themselves. *Renishaw PLC v. Marposs Societa' Group, Inc.*, 262 F.3d 1243, 1248 (Fed. Cir. 1988)("claim construction ... begins and ends in all cases with the actual words of the claim"). The terms in a patent claim are generally "given their ordinary and customary meaning" as understood by one of ordinary skill in the art to which the invention applies. *Phillips v. AWH Corp.*, 415 F.3d. at 1312-13; *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, (Fed. Cir. 2002); *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). "In some cases, the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words." *Phillips*, 415 F.3d at 1314 (citing *Brown v. 3M*, 265 F.3d 1349, 1352 (Fed. Cir. 2001)("the claims 'did not require elaborate interpretation'").

Although claim terms are typically interpreted consistent with their ordinary meaning, a patentee may be his or her own lexicographer and use terms in a manner different from their ordinary meaning. *Vitronics*, 90 F.3d at 1582. A patentee may also use terms which have no ordinary meaning. When doing so, the patentee must clearly state the special definition or meaning of such terms in the specification or file history of the patent. *Id.* (specification can assist interpretation "when it expressly defines terms used in the claims or when it defines terms by implication."); *Markman*, 52 F.3d at 979-80 (claims "must be read in light of the specification, of which they are part"). When interpreting such terms, the Court should limit its interpretation to defining the terms in the claim. The claims are not to be limited by the preferred embodiment or embodiments disclosed in the specification. *Elkay Manuf. Co. v. Ebco*

Manuf. Co., 192 F.3d 973, 978 (Fed. Cir. 1999) ("The general rule, of course, is that the claims of a patent are not limited to the preferred embodiment, unless by their own language.").

Extrinsic evidence –evidence other than the patent and the file history – is less relevant and reliable in interpreting the meaning of the claims. *Phillips*, 415 F.3d at 1317-18. extrinsic evidence cannot provide definitions which contradict the intrinsic evidence. 1322-23; *Vitronics*, 90 F.3d at 1584, n.6. Nevertheless, expert testimony can be useful for a variety of purposes in construing the claims. Such testimony provides the court with background on the technology and an understanding of how one of ordinary skill in the art would interpret the claims. The claim constructions set forth below are supported by the Statement of Ian Lewin (attached as Exhibit 2), as one of ordinary skill in the art of lighting design.

III. CLAIM INTERPRETATION OF THE '254 PATENT.

The '254 patent, titled Integrated Medical Light System, issued August 6, 1991. The '254 patent relates to a ceiling mounted medical lighting system including a reading light, an examination light, and an ambient light. As disclosed in the '254 patent, each light directs light to a different portion of a hospital bed for a different purpose. The reading light is directed toward a reading area on a hospital bed directly below the fixture. The examination light is directed to the entire top surface of the hospital bed. The ambient light is directed to a wall abutting the head of the hospital bed so that it is reflected back to a large area in the vicinity of the hospital bed.

The patent includes fourteen claims, two of which, claims 1 and 3, are independent. An independent claim recites all of the elements necessary to infringe the claim. A dependent claim references another claim and necessarily includes all of the elements recited in the claim itself and recited in the claim or claims from which it depends.

The discussion below does not include every term of all of the claims. The parties, through counsel, have discussed the claims and the terms which are believed to require interpretation by the Court due to disputes as to how these terms should be understood. All disputed terms are discussed in this statement. All terms which are not discussed are believed by both parties to retain their ordinary meaning and to be clear. Furthermore, ALS asserts that most of the disputed terms also are to be interpreted in accordance with their "ordinary and customary" meanings. The meaning of the terms which have no ordinary meaning are clear from the disclosure of the '254 patent.

A. Claim 1

Claim 1 of the '254 patent is directed to "a medical lighting system" and includes four elements:

1. a body;

2. means for ceiling-mounting said body;

3. a first light fixture within said body oriented to direct light downwardly to a selected reading area under said body;

4. a second light fixture within said body oriented to direct light downwardly and outwardly to a vertical wall surface outwardly adjacent from said body whereby light is reflected back to a broad area under said body.

The terms which require interpretation are underlined above.

1 *Means for Ceiling-Mounting Said Body*

The second element of claim 1 recites means for mounting the body of the lighting system on the ceiling. This element is in means-plus-function format and is to be interpreted pursuant to 35 U.S.C. § 112, paragraph 6. The patent statute provides that claim elements may

be written as means for performing specified functions without recitation of specific structures which perform those functions. Such claim elements are to be interpreted to include the structures shown in the specification for performing the recited functions, and equivalents thereof. In interpreting such an element, the Court must first determined the recited function. Once the function is determined, the Court is to determine the structures recited in the specification for performing function. Claim interpretation requires both the determination of the function and determination of the disclosed structure or structures.

With respect to claim 1, the recited function is mounting the body on the ceiling. However, the specification of the '254 fails to disclose any structures for performing that function. Therefore, this claim element cannot be fully interpreted by the court. When the specification fails to recite any structure for performing a function recited in the claim, the claim is invalid. *Atmel Corp. v. Information Storage Devices*, 198 F.3d 1374, 1378-1379 (Fed. Cir. 1999); *In Re Donaldson*, 16 F.3d 1189, 1195 (Fed. Cir. 1994). While the issue of invalidity not currently before the Court in connection with its claim interpretation, the court will be unable to provide a complete interpretation of this element as a result of the lack of any structure in the specification.

2. *Oriented to direct light*

The third element of claim 1 recites a first fixture within the body oriented to direct light. The term "oriented to direct light" is used repeatedly throughout the claims of the '254 patent. This term can be interpreted in accordance with its ordinary meaning. "Oriented," within the context of the claims, means "to put in correct position or relation". *See* excerpts from Webster's Third International Dictionary (hereinafter "Websters"), attached as Exhibit 3. "To direct" means "to follow a straight course with a particular destination". Websters, Exhibit 3. Thus, the

first light fixture is defined by a structure positioned to aim light emitted by the fixture to a destination. As discussed by Dr. Lewin, one of ordinary skill in the art would understand that "directing light" means that the majority of the light or the highest intensity light from the fixture is purposely directed towards a target. See Statement of Ian Lewin, p. 2. Light from any fixture is dispersed in many directions. However, the recitation in the claims of the light being "directed" requires that the light be aimed in a direction. This is understood by those of ordinary skill in the art as a reference to the majority of the light or the part having the highest intensidy. If only a small portion of the light is emitted by a fixture in a recited direction, the light cannot be considered to be directed in that direction. Claim 1 further identifies how the light is aimed by identifying a direction and a target area to which the light from the fixture is directed.

If claim 1 were interpreted so as not to be limited to the highest intensity light being aimed in the direction towards the recited target, the claim would be invalid. Various prior art patents disclose lighting fixtures providing light from different sources in many directions. See Statement of Ian Lewin, pp. 6-10. Claim of the '254 patent differs from these prior art patents in that it recites directing the light in specific directions to a specific target area. Generally, claims should be interpreted to preserve validity. *ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577 (Fed.Cir.1984) ("claims should be so construed, if possible, as to sustain their validity"). Therefore, claim 1 should be interpreted to require the highest intensity light to be aimed in the recited direction to the recited target.

3. *Downwardly*

Claim 1 recites that the first fixture directs the light downwardly. This term provides the direction for the highest intensity of the light. The ordinary meaning, decending from a source

(Websters), can be used for this term. Downwardly means that the light is aimed below the first fixture. See Statement of Ian Lewin, p. 2

4. *A Selected Reading Area*

The target area recited in claim 1 is "a selected reading area under said body." This term has no ordinary or customary meaning. Thus, according to the principles of claim interpretation, the specification must be used in determining the meaning of this term. The claim itself identifies the reading area as being under the body or the light fixture. The specification identifies the reading area by reference number 400 in Fig. 1. It further indicates an objective of the invention as providing a reading light for illumination over an area appropriate for a patient reading in bed. ('254 patent, col. 1, lines 42-47; col. 2, lines 3-6). Thus, the reading area is a defined area under the lighting system body used by a patient for reading. See Statement of Ian Lewin, pp. 2-3.

5. *Second Light Fixture – Oriented to Direct Light*

The final element recited in Claim 1 is a second light fixture within the body oriented to direct light. The term "oriented to direct light" has the same meaning as discussed above with respect to the first light fixture. The second light fixture is arranged to aim the light in a given direction. As discussed above, the terms "to direct light" means that the majority of light or highest intensity light is aimed in the given direction.

6. *Downwardly and outwardly*

Claim 1 recites the direction of the light from the second light fixture as "downwardly and outwardly." This differs from the direction of light from the first fixture which was just "downwardly." Downwardly refers to a direction below the fixture. Outwardly means toward the outside or in an outward direction. Websters, Exhibit 3. Downwardly and outwardly, when

used jointly, mean a direction which is below, yet outside the area of the body. This direction is consistent with the target area, the vertical wall surface, as discussed below. See Statement of Ian Lewin, pp. 3-4.

7. *A Vertical Wall Surface Outwardly Adjacent From Said Body*

The target area for light from the second fixture is recited in the claim as "a vertical wall surface outwardly adjacent from said body." This term is interpreted in accordance with its ordinary meaning. The body is mounted horizontally on or in the ceiling. The target for the second light fixture is a vertical wall. The wall is one which is adjacent, i.e., next to or near, the body, which is mounted on the ceiling.

8. *Reflected Back To A Broad Area*

The target area for the light from the second fixture is further defined by an area to which light is reflected from the wall. Light from the second fixture is aimed at a wall so that it is reflected back off the wall. The light is reflected off the wall to a broad area under the body. As with the reading area, the broad area has not ordinary meaning. The specification identifies the "broad area" as a wide or large area around the patient's bed under the lighting system. ('254 patent, col. 1, lines 42-45; col. 2, lines 6-10).

9. *Summary*

Claim 1, when properly interpreted, requires, among other things, two light fixtures oriented to direct light in two distinct manners. Directing light, in this context, means that the highest intensity light is pointed in a direction to a defined target area. The first fixture directs light in a downward direction to an area, under the body of the lighting system, useful for a patient in a bed under the fixture to read. The second fixture directs light in a downward and

outward direction to a vertical wall so that it is reflected back to an area around a patient bed under the fixture.

Furthermore, this interpretation of claim 1 is consistent with the invention as disclosed in the specification. Fig. 1 illustrates light from the fixtures. The light from the first fixture is shown as exiting the fixture at an angle so as to remain under the body of the lighting system. Fig. 1 further illustrates a reading area 400 as being a portion of the bed. Light from the second fixture is shown as proceeding at an angle away from the fixture to the wall and by the heand of you bed.

B. Claim 3

Independent claim 3 also recites a medical lighting system. It includes five elements. The first four elements are worded identically to the elements of claim 1 These elements should be interpreted in the same manner as discussed above with respect to claim 1. The fifth element recites: "a third light fixture within said body oriented to direct light downwardly under said body to a selected patient examination area." As with the elements of claim 1, the term "oriented to direct light" should be interpreted to mean that fixture has a structure which causes the highest intensity light to be aimed in a direction towards a target. With respect to the third light fixture, the direction is "downwardly" and should be interpreted in the same manner as the direction for the first light fixture discussed above. However, the target area is different for the third light fixture. Claim 3 recites the target area as a selected patient examination area. "Patient examination area" has no ordinary or customary meaning. The specification of the '254 patent, however, clearly identifies the patient examination area as "the entire area of the patient's bed." ('254 patent, col. 1, lines 47-49; col. 2, lines 10-17.) See statement of Ian Lewin, p. 5.

Thus, similar to claim 1, claim 3 should be interpreted to require three light fixtures, each of which cause the highest intensity of light from the fixture to be aimed in the recited direction to a recited target. For the first and third fixtures, the direction is downward below the body of the lighting system. The target area for the first fixture is a portion of the bed area of a patient bed under the lighting system. The target area for the third fixture is the entire patient bed. The second light fixture directs the highest intensity light in a direction downward and outward away from the lighting system to a vertical wall. The light is directed so that it reflects off the wall to a large area around the patient bed.

C. Dependent Claims

Genlyte has asserted infringement of all of the claims of the '254 patent. Claim 2 depends from claim 1. Claims 4-14 depend, directly or indirectly, from claim 3. The dependent claims recite additional features of the various light fixtures of claims 1 and 3. While most of the terms of these dependent claims are clear and receive their ordinary meaning. The parties believe that several terms in these claims require interpretation.

1. *Reflector*

Claims 2 and 4 recite that the first and second light fixtures each include a reflector and a fluorescent bulb. A "reflector" is a known structure in a lighting fixture which causes light to be distributed or directed. Reflectors can have different shapes and surfaces. The reflectors, as recited in claims 2 and 4, are specular or semi-specular surfaces shaped and positioned to reflect light from the bulb in the direction recited in claims 1 and 3. Specular and semi-specular surfaces are a necessary part of claims 2 and 4 so that the light is directed toward the defined target. Diffuse surfaces, which can also be used as reflectors in light fixtures, provide a broad light distribution without providing a directionality of higher intensity light. See Statement of

Ian Lewin, p. 6. Thus, a diffuse surface fails to operate in accordance with the terms of the claims as is excluded from the meaning of the claims of the '254 patent.

2. *Fluorescent Assembly*

Claim 4 recites that the third fixture includes a reflector and fluorescent assembly therein. A fluorescent assembly includes one or more bulbs within a single reflector. See Statement of Ian Lewin, p. 6. The '254 patent discloses two or four bulbs within a single reflector for the examination light. See Fig. 2, col. 2, line 66 – col. 3, line 4.

3. *Light Distribution Pattern*

Claims 5 and 7, which depend from claim 4, recite that the bulbs in the fluorescent assembly have "a light distribution pattern oriented in a direction perpendicular to the ... fluorescent bulbs." A light distribution pattern is a term of art within the lighting industry which means the direction where the major intensity of the light from a bulb is directed. Claims 5 and 7 recite that the major intensity of light from a bulb must be perpendicular to the axis of the bulb.

4. *Glare*

Claims 13 and 14, which depend from claim 3, recite that the fixtures set forth in claim 3 exclude glare from certain areas. Claim 13 recites that the first and second fixtures exclude glare from being directed to a forward area of a standard hospital bed. Claim 14 recites that the first and second fixtures exclude glare from areas adjacent to a standard hospital bed. Glare, under either its ordinary meaning or as understood within the art of the invention, means a level of luminance which causes annoyance, discomfort or loss of visual performance. Claim 3 recites that the fixtures direct light of the highest intensity to specific target areas. Claims 13 and 14 require the light outside the target area to have a sufficiently low intensity so as to not bother persons at those areas.

IV. CONCLUSION

The claims of the '254 patent generally can be interpreted in accordance with the ordinary meaning of the language used in the claims. Such interpretation provides that each of the fixtures recited in the claims cause the highest intensity of light from the fixture to be directed in a defined direction to a defined target location. Furthermore, as recited in the claims, the first and second fixtures direct light in different directions to significantly different target areas.

Respectfully submitted,

Dated: May 17, 2006

Brett N. Dorny, BBO# 628,977
Law Office of Brett N. Dorny
386 West Main Street, Suite 12A
Northborough, Massachusetts 01532
508-709-0501
bndorny@dornylaw.com

Attorney for Defendant

CERTIFICATE OF SERVICE

I hereby certify that this document filed through the ECF system will be sent electronically to the registered participants as identified on the Notice of Electronic Filing (NEF) and paper copies will be sent to those indicated as non-registered participants on May 18, 2006.

Brett N. Dorny

DEFENDANT'S MARKMAN STATEMENT

EXHIBIT 1

United States Patent [19]

Fabbri et al.

[11] **Patent Number: 5,038,254**

[45] **Date of Patent: Aug. 6, 1991**

[54] **INTEGRATED MEDICAL LIGHT SYSTEM**

[75] Inventors: **Wiliam C. Fabbri, Billerica; Roy Crane, Wilmington, both of Mass.**

[73] Assignee: **Keene Corporation, Union, N.J.**

[21] Appl. No.: **629,436**

[22] Filed: **Dec. 18, 1990**

[51] **Int. Cl.**[5] **F21V 13/00**

[52] **U.S. Cl.** **362/33**; 362/225; 362/147; 362/804

[58] **Field of Search** 362/33, 225, 240, 364, 362/147, 804

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,928,757 12/1975 Nelson ..... 362/804 X

4,204,274 5/1980 Lüderitz ..... 362/225 X

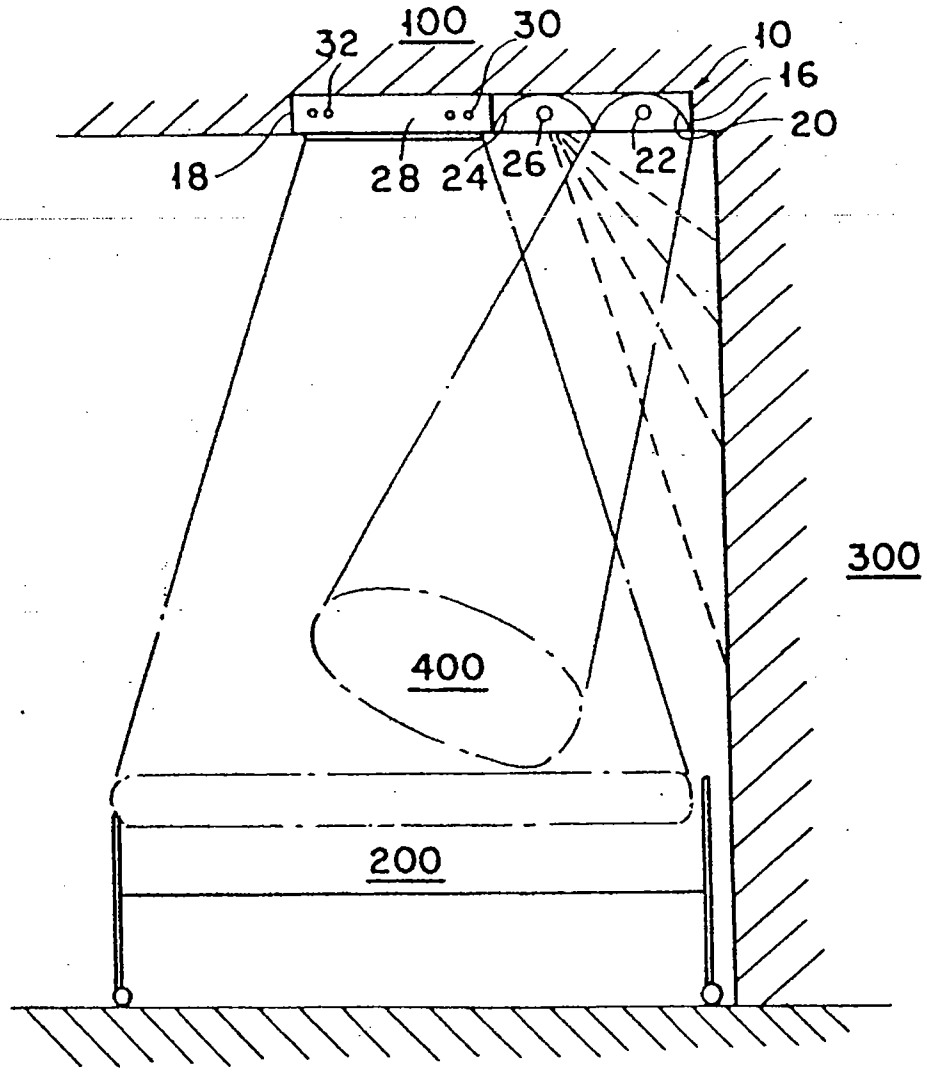
Primary Examiner—Stephen F. Husar

Attorney, Agent, or Firm—Kane, Dalsimer, Sullivan, Kurucz, Levy, Eisele and Richard

[57] **ABSTRACT**

The apparatus is a medical lighting system which includes a ceiling-mount reading light, examination light and ambient light. The reading light is directed toward a selected reading area on a hospital bed directly below the medical lighting system. The examination light illuminates the entire top surface of the hospital bed. The ambient light directs light to a wall abutting the head of the hospital bed thereby providing reflected light to the vicinity of the hospital bed.

14 Claims, 2 Drawing Sheets



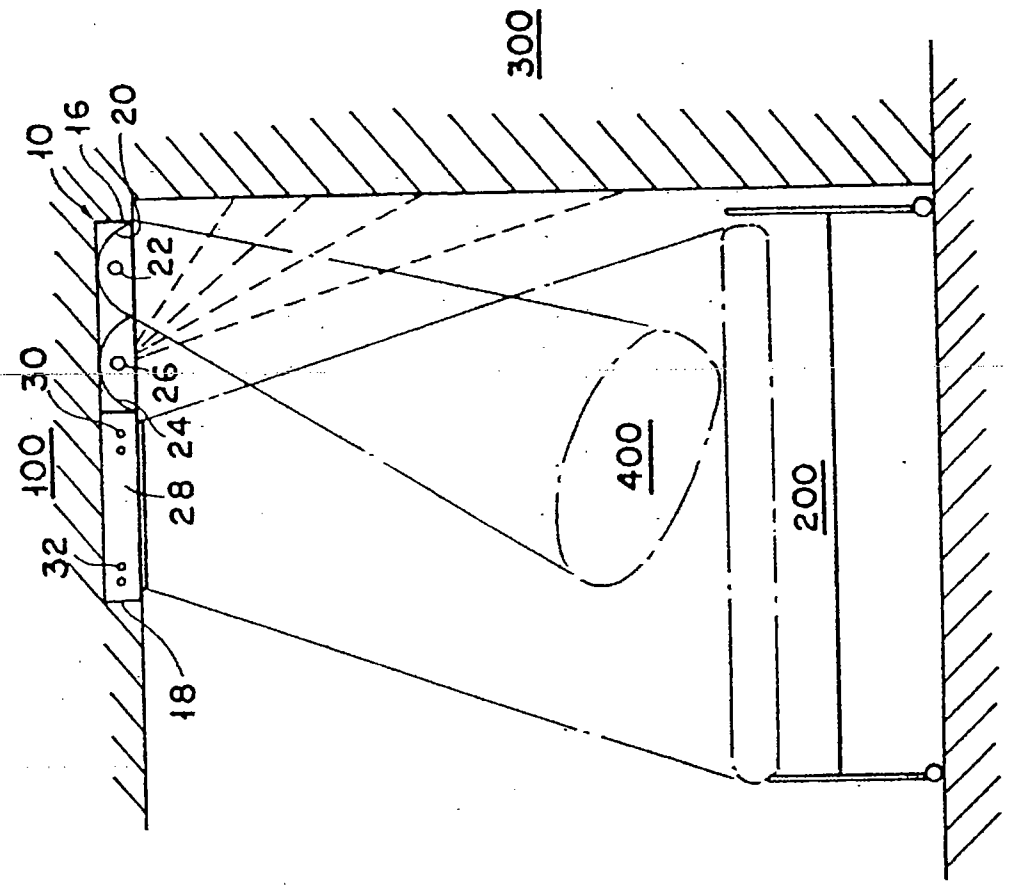


FIG. 1

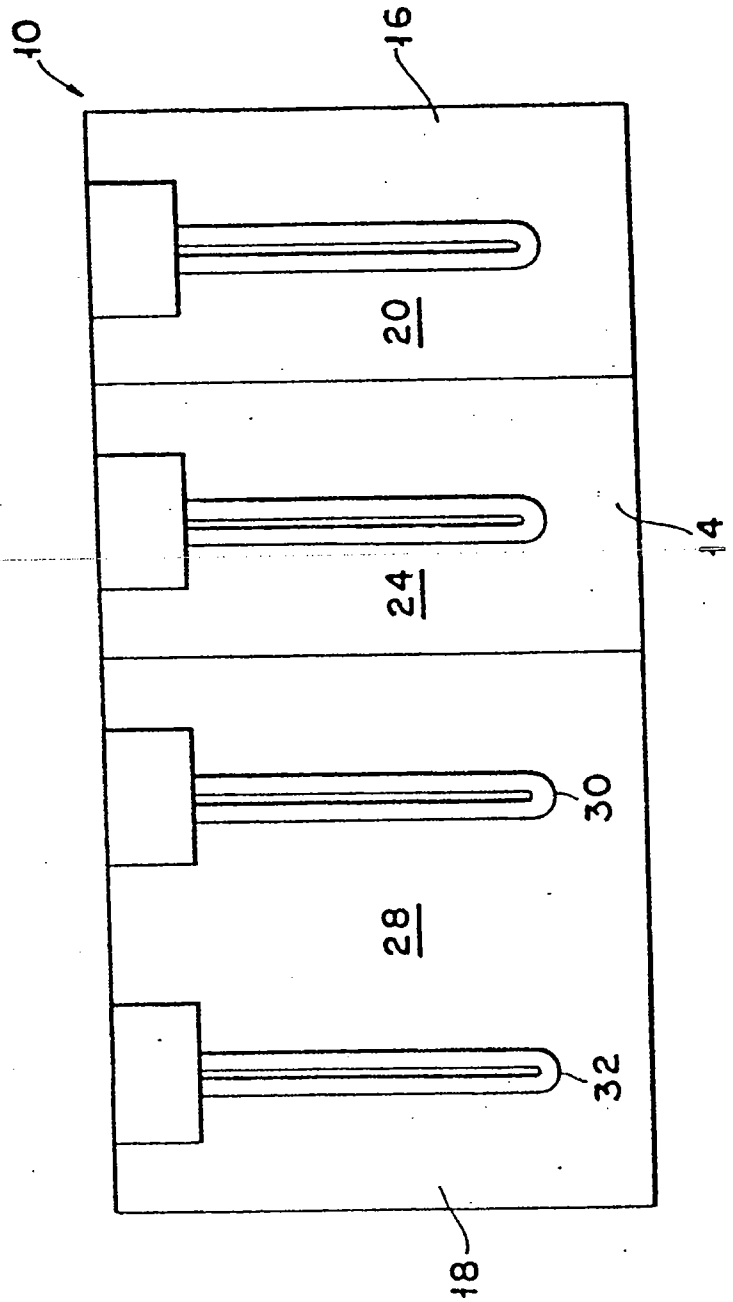


FIG. 2

INTEGRATED MEDICAL LIGHT SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention pertains to a light system for use in hospitals and health facilities. The light system includes an examination light, an ambient light, and a reading light and is preferably mounted in the ceiling.

2. Description of the Prior Art

In hospitals and similar health or medical facilities, it is desirable to provide the bedridden patient with three types of lights—the first is an ambient light which provides background, preferably reflected, light to a large area surrounding the bed; the second is a reading light which provides direct light to a portion of the patient's bed; and the third is an examination light which directs a high intensity light to substantially the entire area of the patient's bed. The ambient light typically has an illumination value of approximately 50 foot-candles while the reading light typically has an illumination value of approximately 70 foot-candles and the examination light typically has an illumination value of approximately 100 foot-candles.

In the prior art, these lights were typically provided individually in a haphazard way. Different types of lamps and light fixtures were placed around the bed with numerous plugs competing with medical equipment for available outlet space. Moreover, such an arrangement was unsightly and could impede the mobility of the patient, the patient's bed, or the surrounding medical equipment.

Wall-mounted fixtures alleviated some of the above-identified deficiencies but still left much to be desired aesthetically and, more importantly, could impede access to the patient, and were easily damaged by motor driven bed headboards.

OBJECTS AND SUMMARY OF THE INVENTION

It is therefore an object of this invention to provide an integrated medical lighting system which provides an ambient light with an illumination value of about 50 foot-candles over a wide area; a reading light with an illumination value of about 70 foot-candles over an area appropriate for a patient reading in bed; and an examination light with an illumination value of about 100 foot-candles over the entire area of the patient's bed.

It is therefore a further object of this invention to provide an integrated medical lighting system which requires no more than one or two electrical connections.

It is therefore a still further object of this invention to provide an integrated medical lighting system which does not impede access to the patient, the patient's bed, or surrounding medical equipment.

It is therefore a final object of this invention to provide an integrated medical lighting system which is aesthetically pleasing.

These and other objects are effectively attained by providing a ceiling-mounted medical lighting system which includes three individual dedicated light fixtures. The lighting system is rectangular and is designed to be placed so that one of the shorter ends of the rectangle is placed substantially on the ceiling-wall interface directly over the head of the patient's bed. The bed is placed so that the longer sides of the bed are parallel to the longer sides of the rectangular light fixture.

A first light fixture includes a fluorescent bulb and a reflector designed to direct light toward the forward portion of the patient's bed so as to allow a patient to read comfortably. A second light fixture includes a fluorescent bulb and a reflector designed to direct light toward a vertical wall abutting the head of the patient's bed so as to provide a reflected light over a large area around the patient's bed. A third light fixture includes two to four fluorescent (preferably biax® or other U-shaped) bulbs which are oriented perpendicularly to the bed. The fluorescent bulbs have a light distribution pattern which is substantially oriented in the direction perpendicular to the bulb. Therefore, the entire area of the bed is efficiently illuminated providing an examination light.

BRIEF DESCRIPTION OF THE DRAWINGS

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIG. 1 is a side plan view of the integrated medical light system of the present invention.

FIG. 2 is a bottom plan view of the integrated medical light system of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in detail wherein like numerals indicate like elements throughout the several views, FIG. 1 is a side plan view of lighting fixture 10 shown installed in ceiling 100 directly over bed 200. FIG. 2 shows the rectangular shape of lighting fixture 10 formed by long sides 12, 14 and short sides 16, 18. Long sides 12, 14 are typically four feet in length while short sides 16, 18 are typically two feet in length. As shown in FIG. 1, short side 16 abuts the wall-ceiling (300, 100, respectively) interface directly over the head of bed 200. Long sides 12, 14 are parallel to the longer side of bed 200.

Reading light reflector 20 is along short side 16 of lighting fixture 10 proximate to wall 300 and includes a fluorescent bulb 22 positioned therewithin parallel to short sides 16, 18 of lighting fixture 10 so as to provide a direct light to reading area 400 of bed 200 as shown on FIG. 1. Reflector 20 and bulb 22 are chosen to provide an illumination of approximately 70 foot-candles to reading are 400.

Ambient light reflector 24 is inwardly adjacent to reading light reflector 20 and includes a fluorescent bulb 26 positioned therewithin parallel to short sides 16, 18 of lighting fixture 10 so as to reflect or bounce light from wall 300 thereby providing ambient light to bed 200. Reflector 24 and bulb 26 are chosen to provide approximately 50 foot-candles of illumination to the ambient area.

Reflectors 20, 24 and bulbs 22, 26 are configured so as not to direct glare toward the head of bed 200 where the patient's head is likely to be, whether in a supine or sitting position. Similarly, reflectors 20, 24 and bulbs 22, 26 are configured so as not to direct glare to areas adjacent to bed 200 so as to allow other beds (not shown) to be placed proximate thereto without undue disturbance of neighboring patients.

Examination light reflector 28 is outwardly adjacent to ambient light reflector 24, includes short side 18 and is opposite from reading light reflector 20. Examination

light reflector 28 includes two to four fluorescent bulbs 30, 32. Fluorescent bulbs 30, 32 (preferably biax ® or other U-shaped) are parallel to short sides 16, 18 of lighting fixture 10. As fluorescent bulbs 30, 32 have a characteristic directional light distribution pattern oriented in the direction perpendicular to the bulbs, the entire area of the bed 200 is efficiently illuminated. The bulbs 30, 32 and reflector 28 are chosen to provide 100 foot-candles of illumination to the bed 200. An important feature of the present invention resides in the orientation of the lamps within the lighting 1 fixture which permits the lighting fixture 10 to be packaged in a two foot by four foot configuration and thereby replace a conventional troffer.

Bulbs 22, 26, 30 and 32 are powered by a single electrical source, preferably supplied from wiring within ceiling 100 although the use of a single electric cord (not shown) engaging an electrical socket (not shown) may be used. A single switch module (not shown), either hand-held or built into wall 300, is used to control bulbs 22 and 26 and a wall switch to control bulbs 30 and 32.

To use this device, the patient operates the switch module (not shown) to operate selectively bulbs 22 and 26. Medical personnel control bulbs 30 and 32 of the examination lighting from a switch on the headwall, not easily accessible to the patient.

Thus the several aforementioned objects and advantages are most effectively attained. Although a single preferred embodiment of the invention has been disclosed and described in detail herein, it should be understood that this invention is in no sense limited thereby and its scope is to be determined by that of the appended claims.

What is claimed is:

1. A medical lighting system comprising:

a body;

means for ceiling-mounting said body;

a first light fixture within said body oriented to direct light downwardly to a selected reading area under said body;

a second light fixture within said body oriented to direct light downwardly and outwardly to a vertical wall surface outwardly adjacent from said body whereby light is reflected back to a broad area under said body.

2. The medical lighting system of claim 1 wherein said first light fixture includes a first reflector and a first fluorescent bulb therewithin; and said second light fixture includes a second reflector and a second fluorescent bulb therewithin.

3. A medical lighting system comprising:

a body;

means for ceiling-mounting said body;

a first light fixture within said body oriented to direct light downwardly to a selected reading area under said body;

a second light fixture within said body oriented to direct light downwardly and outwardly to a vertical wall surface outwardly adjacent from said body whereby light is reflected back to a broad area under said body;

a third light fixture within said body oriented to direct light downwardly under said body to a selected patient examination area.

4. The medical lighting system of claim 3 wherein said first light fixture includes a first reflector and a first fluorescent bulb therewithin; said second light fixture includes a second reflector and a second fluorescent bulb therewithin; and said third light fixture includes a third reflector and a fluorescent assembly therewithin.

5. The medical lighting system of claim 4 wherein said fluorescent assembly includes at least one fluorescent bulb with a light distribution pattern oriented in a direction perpendicular to said at least one fluorescent bulb.

6. The medical lighting system of claim 5 wherein said at least one fluorescent bulb is a "biax"-type bulb.

7. The medical lighting system of claim 5 wherein said fluorescent assembly includes at least two fluorescent bulbs with a light distribution pattern oriented in a direction perpendicular to said at least two fluorescent bulbs.

8. The medical lighting system of claim 7 wherein said at least two fluorescent bulbs are "biax"-type bulbs.

9. The medical lighting system of claim 5 wherein said body is rectangular and a first shorter and of said body is designed to abut the vertical wall surface; wherein said first fluorescent light fixture abuts said first snorter end and said first fluorescent light bulb is parallel to said first shorter end; wherein said second fluorescent light fixture is inwardly adjacent to said first fluorescent light fixture and said second fluorescent light fixture is parallel to first shorter end; and wherein said third fluorescent light fixture is outwardly adjacent from said second fluorescent light fixture and abuts a second shorter end of said body; and wherein said at least one fluorescent bulb is parallel to said first shorter end.

10. The medical lighting system of claim 9 wherein said first and second shorter ends are substantially two feet in length and said body includes first and second longer ends which are substantially four feet in length.

11. The medical lighting system of claim 9 wherein said first light fixture illuminates said selected reading area to substantially 70 foot-candles; wherein said second light fixture illuminates said broad area to substantially 50 foot-candles; and wherein said third light fixture illuminates said patient examination area to substantially 100 foot-candles.

12. The medical lighting system of claim 11 wherein said patient examination area is sufficient in size to include a standard hospital bed when said first light fixture is substantially directly over a head of the standard hospital bed, the head of the standard hospital bed substantially abutting the vertical wall surface.

13. The medical lighting system of claim 3 wherein a distribution of light from said first and second light fixtures excludes glare from being directed to a forward area of a standard hospital bed placed below the medical lighting system.

14. The medical lighting system of claim 3 wherein a distribution of light from said first and second light fixtures excludes glare from areas adjacent to a standard hospital bed placed below the medical lighting system.

* * * * *

DEFENDANT'S MARKMAN STATEMENT

EXHIBIT 2

UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

GENLYTE THOMAS GROUP LLC, **Plaintiff/Counterclaim Defendant,** **v.** **ARCHITECTURAL LIGHTING SYSTEMS, a division of ARCH LIGHTING GROUP,** **Defendant/Counterclaimant.**	**Civil Action No. 05-CV-10945 REK**

STATEMENT OF IAN LEWIN

May 16, 2006

- **Background and Introduction**

I have been requested by the Law Offices of Brett N. Dorny on behalf of Architectural Lighting Systems ("ALS") to evaluate certain aspects of Patent No. 5,038,254 ('254 patent), inventors Fabbri and Crane, which I understand to be assigned to Genlyte Thomas Group, LLC ("Genlyte").

As background I hold a Ph.D. in Illuminating Engineering, and I have 38 years of professional experience in matters related to the design and use of lighting equipment. I have served as Research Manager for a major lighting manufacturer, and have operated independent lighting product development facilities for a period of 33 years. This has included development of lighting devices for hospital use. I hold 22 US patents for lighting products. I am past-president of the Illuminating Engineering Society of North America, IESNA and have served on numerous national and international standards committees concerning light and lighting equipment. My full Curriculum Vitae is attached as Exhibit A. My CV provides the titles and publication journals of 141 technical papers authored by me on the subject of lighting, many of which have been presented to meetings of scientific organizations and peer reviewed.

Claim Construction

I have reviewed the claims of the '254 patent, and in particular certain specific terms, to ensure that their meaning is clear. I have concentrated on the independent claims, namely claims 1 and 3. During this effort I have analyzed the claim terminology as I believe it would be understood by a person of ordinary skill in the art.

- **Claims 1 and 3. "... oriented to direct light downwardly to a selected reading area."**

Term: "oriented"

Meaning: set and angled

Rationale: In order to achieve emission of the light rays in the required direction, the lighting fixture must be set in a position to allow this to happen and must be angled appropriately for the purpose.

Term: "to direct light"

Meaning: to aim the highest intensity of light

Rationale: The term "direct" has a specific meaning, and refers to the *purposeful directing of the highest intensity of light towards a target.* For example, if a hiker directs his flashlight to a mile marker, he aims the flashlight to the target, which in this case is the mile marker, causing the flashlight's highest intensity to fall on the target. Thus the hiker achieves his purpose, which is to provide enough light for reading of the mile marker. If the hiker aims his light elsewhere, say 10 feet to the left of the mile marker, some light will still fall on the mile marker, but it cannot now be said that he is still directing his light to the mile marker. Thus the ordinary meaning of the verb "direct" in reference to lighting is that the highest or maximum intensity is aimed at a desired target to achieve a specific purpose.

Term: "downwardly"

Meaning: in a direction below a horizontal plane through the fixture

Rationale: The downward component of a lighting fixture is defined in the glossary of the handbook of the IESNA, 8th edition, as "The portion of luminous flux from a luminaire emitted below the horizontal." Exhibit B.

Term: "to a selected reading area"

Meaning: to a reading area on or above the bed.

Rationale: For the claim limitation to have meaning, there must be a target area to which the maximum intensity is aimed. Without a target, the terminology "to direct light" is unclear. This target area, both by claim language and as it will be understood from the specification, is the reading area.

The terminology "oriented to direct light downwardly to a selected reading area" therefore means "set and angled to aim the highest intensity of the light in a direction below a horizontal plane through the fixture to a reading area on or above the bed."

Claims 1 and 3. "... oriented to direct light downwardly and outwardly to a vertical wall surface..."

Term: "oriented to direct light" See above definitions.

Term: "downwardly and outwardly to a vertical wall surface"

Meaning: a single direction below and outwards from the fixture so as to illuminate a vertical wall surface.

Rationale: The vertical wall is the target area for the second light, and therefore it is to this wall that the highest intensity of light is to be directed. This is made clear in the specification: " ... so as to reflect or bounce light from wall 300 thereby providing ambient light to bed 200." Column 2, lines 53-55. The specification further states that the fixture components "are configured so as not to direct glare toward the head of the bed 200 where the patient's head is likely to be ..." Column 2, lines 58-60.

It is apparent to a person skilled in the art, therefore, that a fundamental concept of the invention is the inclusion of a light fixture that preferentially directs light to an end wall, and that the reason for doing so is to reduce brightness of the fixture as seen by the patient, thus eliminating glare.

Such a principle is not simply part of a preferred embodiment, but is rather a basic principle of the covered device. This is clarified under the section "Objects and Summary of the Invention," wherein it is stated "A second light fixture includes a fluorescent bulb and a reflector designed to direct light toward a vertical wall abutting the head of the patient's bed so as to provide a reflected light over a large area around the patient's bed." Column 2, lines 6-10.

A person of ordinary skill in the art will understand that for a light fixture to be effective in providing room ambient lighting through reflection from a wall, the intensity of light directed to the wall must be relatively high. Similarly, such a skilled person will know that prevention of glare to a patient requires a relatively

low intensity of light being directed toward the patient's eyes, other factors being equal.

The basic concept of the second light fixture of the claimed invention, described earlier, necessitates higher intensity in directions toward an end wall than towards the bed, otherwise the second fixture will not be effective and efficient in fulfilling its function. As will be known by a person of ordinary skill in the art, effectiveness and efficiency are essential for an invention as described in the '254 patent to be useful.

The terminology "...oriented to direct light downwardly and outwardly to a vertical wall surface therefore means "set or arranged to aim the highest intensity of the light in a direction below a horizontal plane through the fixture and outwards from the fixture so as to illuminate a vertical wall..."

- **Claims 1 and 3: "... to a vertical wall surface outwardly adjacent from said body whereby light is reflected back to a broad area under said body."**

Term: "outwardly adjacent from said body"

Meaning: that is close to a shorter end of the fixture and adjacent to the head of the patient's bed.

Rationale: To properly comprehend the meaning of this phase, a person of ordinary skill in the art will consult the specification, which states "The light system is rectangular and is designed to be placed so that one of the shorter ends of the rectangle is placed substantially on the ceiling-wall interface directly over the head of the patient's bed." Column 1, lines 65-68.

Term: "reflected back to a broad area"

Meaning: Reflected from the wall to provide illumination over a wide area beneath the body that houses the fixture."

Rationale: The purpose of directing light toward the end wall is so that reflected light from the wall provides the room ambient illumination, rather than such illumination being created directly by the fixture, where it might create glare to the patient.

Thus the terminology "to a vertical wall surface outwardly adjacent from said body whereby light is reflected back to a broad area under said body" means "to a vertical wall surface that is close to the shorter end of the fixture and adjacent to the head of the patient's bed, whereby light is reflected from the wall to provide illumination over a wide area beneath the body that houses the fixture."

- **Claim 3 "... oriented to direct light downwardly under said body to a selected patient examination area."**

Term: oriented to direct light downwardly

Meaning: See above

Term: "... to a selected patient examination area"

Meaning: to an area on or above the bed

Rationale: Just as the first and second lights have target areas to where the highest light intensity is directed, so must the third light, in order to give meaning to the limitation. In this case the target area is the patient on the bed.

The terminology "... oriented to direct light downwardly under said body to a selected patient examination areas" means "... set and angled to aim the highest intensity of the light in a direction below a horizontal plane through the fixture to the area on or above the bed."

- **Additional Consideration Regarding the Second Light of Claims 1 and 3.**

The meaning of the terminology "... to direct light downwardly and outwardly to a vertical wall surface ..." has been discussed and clarified above. It should be recognized that any alternative understanding of this limitation, whereby "to direct light" is said to encompass the mere spilling of light onto and end wall, without the purposeful aiming of the highest intensity towards the wall, is incorrect. Firstly, use of the verb "direct" in the lighting industry has been illustrated earlier by the analogy of the hiker and flashlight. Secondly, it is my opinion that the language of claim 1 and 3 of the '254 patent that relates to the second light would be meaningless unless it is interpreted as requiring higher intensity of light being directed to an end wall versus elsewhere. Unless interpreted in this sense, the claim language concerning the second light would be descriptive of virtually any ceiling mounted lighting fixture. Hundreds of commercial lighting products are available for general lighting, or "ambient" lighting in the words of the patent, that provide light in both downward and outward directions towards a wall, but that have higher intensities straight down rather than to a wall. Thus the claim language is meaningless unless it is applied with the understanding that more light, in terms of higher intensity, is directed towards an end wall than elsewhere. As has been made clear in the specification, the inventors intended that "the second light includes a fluorescent bulb and a reflector designed to direct light to a vertical wall abutting the head of the patient's bed so as to provide a reflected light over a large area around the patient's bed." Column 2, lines 6-10.

- **Claims 2 and 4 "...reflector..."**

Term: "reflector"

Meaning: a semi-specular or specular surface shaped and positioned to reflect light from a fluorescent bulb in a desired direction.

Rationale: When it is required to aim reflected light in a specific target direction, and such aiming cannot be created simply by a chosen orientation of the tubes, a semi-specular or specular reflecting surface is required to provide the desired directionality.

- **Claims 5 and 7. "...fluorescent assembly..."**

Term: "fluorescent assembly"

Meaning: One or more fluorescent bulbs within a single reflector.

Rationale: Each fluorescent assembly consists of one or more fluorescent bulbs that are grouped within a particular fixture and are optically controlled by a reflector.

- **Claims 5 and 7. "...with a light distribution pattern oriented in a direction..."**

Term: "a light distribution pattern"

Meaning: The direction(s) where the major intensity of light is projected.

Rationale: The claim is describing the main projection of light from a fluorescent bulb, which is perpendicular to the axis of the bulb, and which can be identified by the major intensity from the tube.

- **Claims 13 and 14. "...excludes glare from being directed..."**

Term: "glare"

Meaning: A sense of annoyance, discomfort or loss in visual performance or visibility created by excessive luminance.

Rationale: Definition of glare, Handbook of IESNA, 8th Edition, Glossary of terms. Exhibit H.

Prior Art Issues Related to Invalidity

I have been requested to locate and review materials that may be considered to be prior art to the '254 patent. I have secured and reviewed the following:

U.S. Patent no. 2,557,129 ('129 patent) Inventor: McDaid. "Spotlighting Unit" Date of issue: June 1, 1948. Exhibit C.

U.S. Patent no. 4,816,969 ('969 patent) Inventor: Miller. "Wall-mounted over Bed Lighting Fixture" Date of issue: March 28, 1989. Exhibit D.

I have further examined the 8th edition of the Handbook of the Illuminating Engineering Society of North America, specifically the section devoted to luminaires, (i.e. lighting fixtures).

- The '129 Patent. Exhibit C.

The '129 patent discloses a spotlight that attaches to a ceiling lighting fixture.

The spotlight, and the ceiling fluorescent light to which it is attached, form a composite light device with multiple uses. The spotlight can be employed to direct light to a specific area, and as such it can function as a reading light. The ceiling fluorescent light is simply described as "a ceiling type fixture," which a person of ordinary skill in the art will understand can be used for the purpose of providing general or ambient room lighting by conventional means.

The two lights are electrically interconnected "in operative association therewith." (Column 1, lines 11-12).

It is apparent from the teaching of this patent that a ceiling mounted lighting fixture can serve multiple separate functions. It may usefully be employed over a hospital bed. In such an application, the spotlight can function as a reading light, with the fluorescent light providing ambient light. Certain ceiling fluorescent lights such as those described in the '129 patent may direct their maximum intensity at or around nadir. Such a fixture is illustrated in the Handbook of the Illuminating Engineering Society of North America, 8th edition, figure 9-34, "typical luminaire" no. 36. Exhibit E. It may be noted that if placed above a bed, and particularly if oriented parallel to an end wall, some light will fall on the end wall.

Other ceiling fluorescent lights are designed to cast their maximum intensity at higher angles from nadir, considering directions perpendicular to the lamp axis. Such a typical fixture also is illustrated in the Illuminating Engineering Society of North America Handbook, figure 9-34, "typical luminaire" no. 35. Exhibit E. From the polar intensity diagram immediately right of the fixture diagram, the maximum intensity in a plane perpendicular to the lamps is at roughly 35° from nadir. Such a light positioned reasonably close and parallel to an end wall will direct its maximum intensity onto the end wall. It will thereby create ambient lighting by reflection from the wall.

The '129 patent specifies that the spotlight is contained in an "outer shell" which attaches to the end of a fluorescent fixture. This is illustrated in figure 1 of the

patent as having a contour that in essence extends the fluorescent fixture by adding a matching compartment to house the spotlight. It will be obvious to a person of ordinary skill in the art that while the spotlight can be added as an extension of the fluorescent fixture in this way, the fluorescent fixture could alternatively simply be manufactured with this extension as part of its body, similarly providing the required space for the spotlight.

Specifically, the claim 1 of the '254 patent recites:

- "A medical lighting system ..."

The '129 patent discloses a system of two lighting fixtures that can be usefully employed as a medical light.

- "A body ..."

The '129 patent discloses the use of a body, which can house the spotlight only with a separate body for the fluorescent fixture, or through obviousness, a single body that houses the spotlight and the fluorescent fixture.

- "Means for ceiling-mounting said body."

The '129 patent discloses that it uses a "ceiling-type fixture"

- "a first light fixture within said body oriented to direct light downwardly to a selected reading area under said body ..."

The '129 patent provides a spotlight that can be directed to a selected reading area.

- "a second light fixture within said body oriented to direct light downwardly and outwardly to a vertical wall surface outwardly adjacent said body whereby light is reflected back to a broad area under said body."

If the limitation of claims 1 and 3 of the '254 patent concerning the second, or ambient, of this limitation is improperly construed to include any fixture that allows light to fall on an end wall, clearly the '129 patent allows such use.

Moreover, the '129 patent is not limited in terms of the type of fluorescent fixture or light distribution that it may produce. This is specifically stated: "However, it is to be noted that this invention is adaptable for use in association with any type of suspension or ceiling type fixture, the same being shown in the drawings by way of example only." Column 2, lines 10-13. It will be apparent to a person of ordinary skill in the art that the combination light can include a typical luminaire of the type 35 shown in the Illuminating Engineering Society of North America Handbook. Exhibit E. It will further be known by such a person that placing such

a luminaire near a wall will be an effective means of lighting that wall, as the maximum intensity will be aimed towards the wall.

It is apparent, therefore, that if the claim limitation regarding the second light is given its proper interpretation, whereby maximum light intensity is directed to an end wall, such an arrangement will be achieved by using a fixture constructed in accordance with the '129 patent, placed parallel and next to the wall, when the fluorescent portion of the fixture is of the conventional type 35 shown in the Illuminating Engineering Society of North America Handbook, or many others like it. The '129 patent therefore represents prior art to the '254 patent.

If the claim limitation regarding the second light is given a broader but improper limitation such that the light need not be directed towards an end wall but light merely falls upon the wall due to its proximity, then it is preceded by the '129 patent using virtually any available type of ambient light, such as the conventional type 36 shown in the referenced handbook.

- The '969 Patent. Exhibit D.

This patent discloses a wall-mounted version of an over-bed lighting fixture, for use over a patient's bed "and is used in hospitals, nursing homes and the like." Column 1, lines 42-43. It consists of a "single housing", column 1, line 40, within which are two forms of fluorescent lighting fixture. A third form of light optionally can be incorporated into the single housing.

One fluorescent fixture provides downward light through a conventional bottom mounted lens. The second fixture is adjustable and can be pivoted to illuminate different areas depending on its rotational orientation. The device can be rotated such that light is directed towards a patient's reading area, and "Thus, it may be directed to provide a patient reading lamp." Column 1, lines 52-53.

Although the '969 invention is described as wall-mounted, it will be apparent to a person of ordinary skill in the art that it can also be ceiling-mounted. All that is needed is a pair of L-shaped brackets to mount it to the ceiling while retaining its described orientation. The angular setting of the rotatable portion can readily be set while ceiling mounting the fixture so that the light is directed toward a reading area.

All claim elements of claim 1 of the '254 patent are either present or obvious in the '969 patent. It describes a medical lighting system that has a body. A means for ceiling mounting is obvious through the use of simple brackets. The first light fixture or reading light is provided by the rotatable light set to aim to the reading area, and it is included in the body. The second light fixture or ambient light for general illumination is provided and is also in the body.

The ambient light fixture is equipped with "a flat, horizontal, prismatic lens which directs illumination from one or more fluorescent tubes downward to illuminate the head of the bed." The Handbook of the Illuminating Engineering Society of North America, 8th edition, can be consulted to determine the light output from a fluorescent fixture that is equipped with a flat horizontal prismatic lens. Figure 9-34 of the handbook typical luminaire no. 45 shows a fluorescent fixture with a flat prismatic lens, as referred to in the '969 patent. Exhibit F. Observing the intensity polar diagram to the immediate right of the fixture sketch, it is apparent that this fixture has its maximum intensity (towards a parallel wall) that is roughly 40 degrees from nadir. Thus the highest intensity as such is aimed at an end wall.

If the teaching of the '969 patent is used with a different flat lens or diffuser, such as typical luminaire 41 in the Illuminating Engineering Society of North America handbook, maximum intensity is directed towards the bed beneath the fixture. Exhibit G.

My comments regarding invalidity regarding the second light are similar for the '969 patent as for the '129 patent above. The '254 patent, properly applied with regard to the second light is preceded by the '969 teaching using typical luminaire 45 of the Illuminating Engineering Society of North America handbook.

If the '254 claims 1 and 3 limitation regarding the second light is improperly interpreted as encompassing conventional fluorescent light distributions having maximum intensity at or near nadir, the '254 patent is clearly preceded by prior art, as evidenced by the '969 patent.

Ian Lewin

Ian Lewin Ph.D., FIES, L.C.
May 16, 2006

STATEMENT OF IAN LEWIN

EXHIBIT A

Ian Lewin Ph.D. Consulting, LLC

11408 St. Andrew's Way
Scottsdale, Arizona 85254, USA
OFFICE / MOBILE: (480) 861-7076
LABORATORIES: (480) 991-9260
FAX: (480) 609-6623

Ian Lewin - Curriculum Vitae

Qualifications:

- B.S. Cum Laude, University of Newcastle, England 1964. Research thesis title: "A Study of the Glare Characteristics of Locomotive Headlights"
- Ph.D., Illuminating Engineering, University of Newcastle, England 1967. Thesis title: "A Study of the Factors Affecting Visual Performance under Industrial Lighting Conditions, with Particular Reference to Disability Glare and its Measurement"
- Lighting Certified, (LC), Qualified Professional

Positions held:

- 1998-present, President and CEO, Lighting Sciences, Inc., Scottsdale, Arizona
- 1979-98 President and Founder, Lighting Sciences Inc., Scottsdale, Arizona, USA, and Lighting Sciences Canada Ltd., Waterloo, Ontario, Canada
- 1984-92 Co-founder and Director. Lighting Sciences Australasia, Pty Ltd, Melbourne, Australia.
- 1973-79 Principal, Director and Co-founder, Environmental Research Laboratories, Scottsdale, Arizona
- 1967-73 Research Director, Holophane Co.

Memberships:

1. President, Illuminating Engineering Society of North America (IESNA). 1999-2000.
2. Member, Optical Society of America.
3. Member, American Institute of Physics.
4. Member, International Society for Optical Engineering, (SPIE).
5. Member of the U.S. National Committee of the International Commission on Illumination (CIE).
6. Member, Society of Automotive Engineers, (SAE), Lighting Standards Committee.
7. Chairman, Roadway Lighting Committee, Illuminating Engineering Society of North America (1994-96).
8. Chairman of the IESNA Board of Fellows, 1989-90.
9. Director, 1985-86, Illuminating Engineering Society.
10. Alternate Director for the United States, CIE Division 2, Measurement of Light and Radiation.

11. Member and past-chairman, Testing Procedures Committee of the IESNA.
12. Member of Standard Practice Subcommittee, Research Subcommittee, and Measurements and Calculations Subcommittee, Roadway Lighting Committee, IESNA.
13. Member and past-Chairman of the Lamp Spectral Effects Committee of IESNA.
14. Chairman of the Sign Lighting Subcommittee of the Roadway Lighting Committee of IESNA.
15. US representative to CIE Committee on "Photometry of Luminaires" Standard.
16. US representative to CIE Committee on "Lighting and Crime."

Honors/Awards

- Recipient of the 1997 Medal of the Illuminating Engineering Society of North America. (The society's highest honor for technical contributions).
- Louis B. Marks award of the Illuminating Engineering Society of North America. (The society's highest honor for non-technical contributions).
- Fellow of the IESNA.
- Recipient of the Distinguished Service Award of the IESNA.
- Man of the Year, 2001. Aerospace Lighting Institute.
- Honorary Life Member, Institution of Lighting Engineers, UK
- Invited keynote speaker, 25th quadrennial session of the CIE, "Light, Dark Skies and Space." San Diego, 2003.

Teaching Positions

- 1964-67 - Gateshead (UK) College of Technology. Instructor in Lighting Technology, intermediate and advanced courses.
- 1979-82 - Arizona State University. Faculty member, School of Architecture, Illuminating Engineering courses.
- 1967-present - Instructor in numerous courses sponsored by the Illuminating Engineering Society, the Electric League, and Edison Electric Institute.

Past-projects (as Project Director); 50 Examples

Research and Product Development.

1. Exterior lighting systems for NASA International Space Station: Development of multiple designs for outer space operation.
2. Development of FAA Advisory Circular for use of Light Emitting Diode (LED) devices on airport taxiways.
3. Research on the relationship between lamp color, safety and security
4. Modular Wallpack luminaire, refractor and mechanics. (Holophane Module 600)
5. High Intensity Discharge luminaire for highway signs. (Holophane Expresslight)
6. Light trespass research, (for Edison Electric Research Institute)
7. Space Shuttle Orbiter - optical systems for fluorescent and incandescent floodlights
8. Space Shuttle Orbiter – cockpit annunciator display control lenses
9. Development of a scene luminance photometer using digital photography
10. Dental lighting optical system for examination light
11. Roadway luminaire reflectors for cut-off luminaires. (Patented)

12. Parabolic louvers for interior lighting. (Patented)
13. Downlight lens and louvers for interior lighting. (Patented)
14. 3-E lens for high efficiency, widespread distribution interior lighting. (Patented)
15. Triumph I lens for discharge lamps, with high efficiency, widespread distribution. (Patented)
16. Wall mounted refractor/reflector optical system. (Patented)
17. Anti-reflection interference coatings for metal substrates. (Patented)
18. High reflection interference coatings for glass substrates. (Patented)
19. High efficiency aperture - type display signs.
20. High mast system reflector optics for highway interchange lighting
21. Indirect ambient lighting optical systems for offices. (3 Patents)
22. Underwater floodlighting systems for unmanned submarine surveillance, U.S. Navy.
23. Floodlight optics for sports lighting. (Hubbell Lighting)
24. Development of computerized mirror goniophotometer systems
25. Development of automated Spectroradiometer system for ultraviolet, visible and infrared measurements for Bureau of Radiological Health, US Food and Drug Administration
26. Variable reflector system for high intensity flashlights. ("Mag-lite")
27. Computerized design system for automotive headlights. (Sylvania)
28. Design of compression molding facility for lens prototypes
29. Hydroponic plant growth under artificial illumination. (General Mills)
30. Development of square distribution area lighting optics
31. Floodlight reflector design for 3 KW metal halide lamps for Open Pit Mining
32. Projection screen optics for large screen television
33. Sun tracking reflectors for reusable solar energy system
34. Aircraft lighting systems for Boeing 757 and 777 aircraft
35. Compliance testing program for automotive lighting devices. U.S. Dept. of Transportation, National Highway Safety Administration, 1985 - 1992
36. Optical system for surgical illumination. (American Sterilizer)
37. Research of traffic signal optical and electrical efficiency, Federal Highway Administration.
38. System of 480 moving mirrors under computer control for daylighting capture, Bank of Hong Kong and Shanghai
39. Development of traffic signals using Light Emitting Diodes (LED's)
40. Daylighting and building energy monitoring system for improved energy usage
41. Development of outdoor lighting optical controls for use in the vicinity of astronomical observatories
42. Design of tunnel lighting luminaire with asymmetric distribution
43. Research and development of a new navigational lighting system for ships, U.S. Navy
44. Development of airport lighting optics for runway delineation
45. Development of anti-collision warning system for aircraft
46. Development of computerized electrical test apparatus for luminaires and ballasts

47. Visibility research on battlefield decoys, U.S. Army, Fort Belvoir
48. Development of a self-leveling photometer for street lighting measurements
49. Design of landing and taxing lights for the F16 aircraft, U.S. Air Force
50. Research and development of a portable photometer to measure traffic signal performance, Federal Highway Administration. (Patented)

Technical Papers
Acronym list provided at end

1. *An Economic Study of Three Light Sources.* Paper to the IESNA Roadway Lighting Committee. Spring 2004. To be published.
2. *A Long and Winding Road. (The History of Street Lighting).* LD&A, December 2004.
3. *Roadway Lighting: An Investigation and Evaluation of Three Different Light Sources.* Final report to the Arizona Department of Transportation. May 2003.
4. *Lighting in Outer Space.* Proceedings of the 25th quadrennial session of the CIE. San Diego, June 2003.
5. *Lights that Circle the Earth.* LD&A Magazine, July 2003.
6. *Skylights as Luminaires: PIER Skylight Photometric Test Results.* Paper to the IESNA Annual Conference, August 2002.
7. *Lamp Color Influences Energy Usage and Night Safety.* Proceedings of the Intertech Conference on Energy Efficient Lighting, Tucson, Arizona 2002. Leukos JIES, January 2005.
8. *Photometric Test System for Skylights and Luminaires.* Leukos, JIES. January 2005.
9. *Towards an Understanding of Lamp Spectral Effects at Night.* Proceedings of the 2002 Conference of the IES of Australia and New Zealand, Sydney.
10. *White versus Sodium Light: The Newest Developments.* Proceeding of the ILE Annual Conference, Cardiff, Wales, 2002.
11. *Lamp Color Affects Visibility.* Luce magazine, Italy, 2001.
12. *Minimizing Light Trespass – Comparing Fixtures.* Electrical Contractor, July 2001.
13. *Light Trespass – What Does It Mean for Electrical Contractors?* Electrical Contractor, July 2000.
14. *Light Trespass – Research, Results and Recommendations.* Publication TM11 of the IESNA, New York, 2000.
15. *Light Trespass and Light Pollution – Practical Approaches to Dealing with the Problems.* Proceeding of the IESNA Street and Area Lighting Conference, 2000.
16. *Aspects of Recent American Research in Lighting Technology.* Proceedings of the Joint Conference of ILE and CIBSE, York, England, 2000.
17. *Lamp Color, Visibility, Safety and Security.* Seminar proceedings, Lightfair, May 2001
18. *IESNA Approved Method for the Photometric Testing of Fiber Optics Lighting Systems.* IESNA Publication no. LM-73-02.
19. *Lumen Effectiveness Multipliers for Outdoor Lighting Design.* Journal of the IESNA, Summer 2001

20. *Light Trespass Research.* Final Report to the Lighting Research Institute, 2000
21. *Metal Halide Lamps - A Technology Review.* Aerospace Lighting Institute Seminar, January 2000, Conference Proceedings
22. *Photometrics of Fiber Optic Systems.* Proceedings of Lightfair 2000, New York
23. *Should Vision Influence Roadway Lighting Design?* Better Roads Magazine, US Federal Highway Administration, October 1999
24. *Visibility Factors in Outdoor Lighting Design.* Institution of Lighting Engineers Conference Proceedings - Portsmouth, UK, 1999
25. *Accuracy of CCD (Digital Camera) Photometric Testing.* Council on Optical Radiation Measurement, 1999
26. *Development & Analysis of a Pedestrian Crossing Warning System.* Journal of the IESNA, Summer 2000
27. *Improved Luminaire Performance by Use of Reduced Envelope Metal Halide Lamps.* IESNA Conference, 1999
28. *Optical Component Relationships in the Design of Efficient Fiber Optic Illuminators.* Journal of the IESNA, Winter 2000.
29. *Road Scholar (The influence of lamp type on driver visibility at night).* LD&A Magazine, March 1999
30. *Photometric & Optical Methods of Lamp Analysis.* Society of Automotive Engineers (SAE) 1998. SAE transaction
31. *Lamp Spectral Effects at Roadway Lighting Levels.* The Lighting Journal (UK-ILE), 1999
32. *Luminaire Photometry Using Video Camera Techniques.* JIES, Winter 1999
33. *Advanced Techniques in Lamp Characterization.* International Society for Optical Engineering, (SPIE), Conference Proceedings, 1997
34. *Backlighting for Direct View & Projection Displays.* Information Display Magazine, Vol. 13. No. 11, November 1997
35. *Lighting On Three Continents.* CIE/SANCI international conference proceedings, South Africa, 1997
36. *Accuracy Analysis of Video-based Light Measurement.* SAE 1997 Congress Proceedings
37. *On the Road Again (Visibility-based lighting design for improved road safety).* LD+A May 1996
38. *Advances in Measurement Technology for Vehicle Lighting Systems.* SAE Congress Proceedings, 1996
39. *The Design of Illumination Optics: Hardware and Software Aids.* Optical Society of America, 1995 annual conference proceedings
40. *The Design-Link for Aerospace Lighting.* Proceedings of the Aerospace Lighting Institute Conference, February 1995
41. *High Accuracy Photometry Using CCD Technology.* International Society for Optical Engineering, (SPIE), Conference Proceedings, 1995
42. *Optical Design Applications for Enhanced Illumination Performance.* International Society for Optical Engineering, (SPIE), Conference Proceedings, 1995
43. *The Application of Light Emitting Diodes to Traffic Signals.* JIES, Winter 1996

44. *Monte Carlo Techniques for the Design of Illumination Optics.* Paper to the IESNA annual conference, 1995
45. *Requirements for Application of Light Emitting Diodes (LED's) to Traffic Control Signals.* NCHRP Digest, (US Government), January 1995
46. *The Design-Link: Advances in Automotive Lighting Design, Measurement and Quality Assurance.* Conference of the Lighting Committees, SAE. Santa Fe, November 1994
47. *The Development of a High Performance LCD Backlighting System.* Conference transactions of the Society for Information Display, SID 1994, May 1994
48. *Design Technologies for Flat Panel Display Backlighting.* Aerospace Lighting Institute, February 1994, Conference Proceedings
49. *Liquid Crystal Displays - Meeting the Lighting Challenge.* LD&A, July 1994
50. *Understanding and Using Photometric Test Reports for Interior Lighting. Part 1. The Basics.* Published by Lighting Sciences Inc. 1993
51. *Principles of Liquid Crystal Display Backlighting.* SID seminar publication 1993
52. *Measurement of Small Target Visibility and Visibility Level and the Reasons for Possible Deviations.* Proceedings of the Lighting Research Institute Symposium on STV. October 1993
53. *Backlighting Technology for Color Liquid Crystal Displays.* Aerospace Lighting Institute, February 1993, Conference Proceedings
54. *Where No Luminaire Has Gone Before.* (Exterior Lighting of the NASA International Space Station), LD&A, December 1993
55. *The Design of Metal Halide Lamps for Space Station Freedom.* JIES, Summer 1993
56. *Exterior Lighting Systems for Space Station Freedom.* Proceedings of the Aerospace Lighting Institute Conference, 1992
57. *Video Photometry for Quality Control.* LD&A Magazine, January 1992
58. *Aviation Lighting Systems for the Space Station.* Proceedings of the IESNA Aviation Lighting Conference, 1992
59. *Light Trespass: Problems and Directions.* LD+A Magazine, June 1992
60. *Photometry of Traffic Signal Output Using a Portable Traffic Signal Photometer.* National Research Council Symposium, Washington, DC, June 1992
61. *Development of a Portable Traffic Signal Photometer.* (Federal Highway Administration sponsored,) JIES, Winter 1992
62. *Application of Video Camera Techniques to Photometry.* LD+A, January 1992
63. *American Techniques in Outdoor Lighting Design.* Lighting Journal, (UK), Sep. 1992
64. *Near Field Photometry: Part 2.* Lighting Magazine, Canada, 1991
65. *New Directions in Automotive Lighting Photometry.* SAE conference, San Antonio, Texas, April 1991
66. *Using Video Cameras in Photometry.* Lighting Magazine, Canada 1991
67. *Photometry: How Near, How Far?* Lighting Magazine, Canada, February 1991
68. *Further Developments in Tunnel Lighting Computations.* JIES, Winter 1991
69. *Lamp and Ballast Effects on HID Luminaire Performance.* Lighting Magazine, Canada, April 1990

70. *Development of New Photometer Concepts for Quality Control Applications.* Journal of the IES, April 1990
71. *Lens Development for Improved Performance of Daylighting Systems.* JIES 1990
72. *Improving Standards in Roadway Lighting Design.* Lighting Magazine, Canada, 1990
73. *Changing Standards in Outdoor Lighting Design.* Lighting Magazine, Canada. June 1988
74. *Integrating New Technologies into the Lighting Industry.* 1989 Joint Lighting Conference of the IES of New Zealand and Australia; Auckland, New Zealand, November 1989. Lighting in Australia Journal, April 1990
75. *Development of New Photometer Concepts for Quality Control Applications.* JIES, Summer 1990
76. *Optical and Energy Efficiency of Signal Lights.* LD & A, January 1989
77. *The Use of Microcomputers in Roadway Lighting Design.* Paper to the Edison Institute Street and Area Lighting Workshop, Boston, MA, September 1989
78. *Relating Candlepower and Lumens.* Lighting Magazine, Canada. August 1989
79. *Thermal Effects on Fluorescent Luminaires.* Lighting Magazine, Canada. June 1989
80. *How Valid are Luminaire Spacing Criteria?* Lighting Magazine, Canada. Vol. 3, No 1, February 1989
81. *Specifying Reflector Materials.* Lighting Magazine, Canada. Vol. 3, No 2, April 1989
82. *An Index of Lamp Hiding Power for Lensed Fluorescent Luminaires.* JIES, Winter 1989
83. *Taking the Mystery Out of Photometric Test Reports.* Lighting Magazine, August 1998
84. *Automated High Speed Photometry of Aviation Lights.* Transactions of the Aviation Lighting Conference, IESNA, October 1988
85. *Reading Photometric Test Reports: The Fundamental Four.* Lighting Magazine, Canada. Volume 2, Number 4, August 1988
86. *Reading Photometric Reports: Luminaire Efficiency.* Lighting Magazine, Canada. Volume 2, Number 5, October 1988
87. *Photometric Reports: The Absolute Truth or Just Relatively Speaking?* Lighting Magazine, Canada. December 1988
88. *Real World Use of Photometric Test Reports.* January 1988, Lighting Design and Application
89. *Luminaire Quality Control in the Microcomputer Age: Part 2. Lighting Design by Microcomputer.* Lighting Magazine, Canada. Volume 2, No. 2, April 1988
90. *Specification Methods for Reflector Materials.* 1988 IESNA Annual Conference
91. *Luminaire Quality Control in the Microcomputer Age: Part 1. Electrical Testing.* Lighting Magazine, Canada, February 1988
92. *Luminance Calculations for Tunnel Lighting Systems.* JIES, Winter 1988
93. *Photometric and Field Performance of Metal Halide Luminaires.* JIES, Winter 1988
94. *Optical Design of Airport Lighting.* Transactions of the Aviation Lighting Conference, IESNA, October 1987

95. *Setting the Standards for Visual Comfort.* Lighting Magazine, Canada, December 1987
96. *A Computer Standard for Lighting Designers.* Lighting Magazine, Canada, Volume 1, No. 2, September 1987
97. *Who Writes the Standards?* Lighting Magazine, Canada, Volume 1, no. 1, June 1987
98. *Variables in HID Luminaire Photometry.* Paper to the Commission Internationale de l'Eclairage, Venice, June 1987
99. *Photometric and Field Performance of High Pressure Sodium Luminaires.* JIES, Summer 1987
100. *Computer Simulation for Optical Design.* Transactions of the Aviation Lighting Conference, IESNA, October 1986
101. *Hong Kong Bank Scoops the Sun.* Lighting Design and Application, November 1986
102. *Control of Light Pollution - An Engineer's Viewpoint.* Proceedings of the International Conference on Identification, Optimization and Protection of Optical Telescope Sites, May 1986
103. *Using Microcomputers in the Lighting Industry.* LD&A, June 1986
104. *The Optical and Energy Efficiency of Traffic Signals.* Public Roads Magazine, (Federal Highway Administration). December 1985, Vol. 49, no. 3
105. *Performance Characteristics of Fluorescent Lamp and Ballast Combinations.* JIES, October 1983, Volume 13, No. 11
106. *Optimization Techniques for Outdoor Lighting Design.* LD&A, March 1983
107. *The Effect of Room Obstructions on the Calculation of Inter-reflected Components.* IESNA Annual Technical Conference. 1982
108. *Solar Lighting Using Sun Tracking Reflectors.* IESNA Annual Technical Conference, 1981
109. *Optical Radiation Emissions From Selected Sources.* Project final report to the Bureau of Radiological Health, US Food and Drug Administration, 1980
110. *Improved Techniques for Luminaire Photometry.* IESNA Annual Technical Conference, 1980
111. *A Designer's Guide to Illumination Optics.* Optical Spectra, November 1979
112. *Developments in High Speed Photometry and Spectroradiometry.* JIES, July 1979
113. *Theoretically Speaking.* LD&A, January 1977
114. *New Techniques for Reflector Design and Photometry.* JIES, July 1977
115. *Computer Design of Luminaires.* LD&A Magazine, August 1977
116. *An ESI Study for Different Tasks.* JIES, October 1976. IESNA Transaction
117. *ESI Computation Becomes More Versatile and More Useful.* LD&A, November 1976
118. *Computerized Methods for Outdoor Lighting Design.* LD&A, December 1975
119. *Computer Modeling of Illumination Systems.* Proceedings of the Lighting Energy Symposium, US Federal Energy Authority, October 1975
120. *Computerized Methods of Outdoor Lighting Design.* LD&A, April 1975
121. *Automating Point-by-Point Illumination and ESI Computations.* LD&A, August 1974

122. *A Proposal for ESI Ratings.* JIES, April 1974. IESNA Transaction
123. *Advances in Luminaire Photometry.* Optical Spectra, October 1974
124. *ESI and Polarized Photometry.* LD&A, January 1974
125. *A Luminance Approach to Highway Sign Lighting.* JIES, January 1974. IESNA Transaction
126. *The Application of ESI Predetermination Techniques.* JIES, April 1973. IESNA Transaction
127. *RQQ Report No. 5 - Its Use and Meaning.* LD&A, January 1973
128. *The Determination of Luminaire Projected Area.* JIES, July 1973
129. *Visual Comfort Probability - For All Luminaires.* LD&A, March 1973.
130. *Outdoor Lighting and Astronomy - A New Problem.* LD&A, July 1973
131. *New Concepts in Direct Glare Control.* JIES, April 1973. IESNA Transaction
132. *The Effect of Illumination Systems upon Visual Performance.* US National Bureau of Standards Special Publication 361, vol. 1, March 1972
133. *Veiling Reflection Control.* Electrical Consultant, November 1971
134. *Numerical Evaluation of Veiling Reflections.* Proceedings of the Commission Internationale de l'Eclairage (CIE). Barcelona, 1971
135. *Luminaire Design Related to Visibility.* IEEE conference proceedings, October 1971
136. *Veiling Reflection Control by Candlepower Distribution.* Illuminating Engineering, October 1970. IESNA Transaction
137. *Physical Factors Affecting Visual Performance.* Optical Spectra, Nov/Dec 1969
138. *The Human Eye.* Optical Spectra, 1969
139. *Photometric Units and Terms.* Optical Spectra, 1968
140. *Luminance Measurements by Photographic Photometry.* Illuminating Engineering, November 1968. IESNA Transaction
141. *A Basis of Luminance Design for the Lighting of Road Tunnels.* Commission Internationale de l'Eclairage, (CIE), Washington, D.C., 1967

References:

CIE:	Commission Internationale de l'Eclairage (International Commission on Illumination)
IEEE:	Institution of Electrical and Electronics Engineers
IESNA:	Illuminating Engineering Society of North America
ILE:	Institution of Lighting Engineers (UK)
JIES:	Journal of the Illuminating Engineering Society of North America
LD&A:	Lighting Design and Application
NCHRP:	National Cooperative Highway Research Program
SAE:	Society of Automotive Engineers
SANCI:	South African National Conference on Illumination
SID:	Society for Information Display
SPIE:	International Society of Optical Engineering

List of Patents Held

1. Refractive Grid lens. Optical grid for concentration of light from a lighting fixture, removing glare US patent no. 3,763,369
2. Fluorescent lens. Means of providing high efficiency control from fluorescent fixtures US patent no. 3, 988,609
3. Indirect luminaire. Reflector system for providing work plane illumination by reflecting light from room surfaces US patent no. 4,065,667
4. Optical coatings for illumination systems US patent no. 4,173,778
5. Optical coatings for illumination systems US patent no. 4,112,483
6. Optical coatings for illumination systems US patent no. 4,310,876
7. Optical coatings for illumination systems. Four patents covering unique applications for control of visible and infra-red radiation in high efficiency optical systems US Patent no. 4,081-667
8. High Intensity Discharge reflector system for ambient lighting US patent no. 4,229,782
9. High Intensity Discharge reflector system for ambient lighting with cut off US patent no. 4,344,111
10. Lens for control of High Intensity Discharge lamp US patent no. 4,262,326
11. Fluorescent indirect luminaire 4,388,675
12. Forward throw optical system US patent no. 4,383,289
13. Segmented luminaire. Refractor/reflector system for providing adjustable lighting patterns US patent no. 4,575,788
14. Signal. Method for providing high efficiency signaling device US patent no. 4,652,851
15. Wall mounted luminaire. High efficiency wall mounted area lighting system US patent no. 4,559,587
16. Wall wash lighting system. Luminaire for even illumination of vertical surfaces US patent no. 4,564,888
17. Glare reducing lens. An improved lens system for reducing glare and providing improved lamp hiding power US patent no. 4,703,405
18. Lens/Louver combination for interior lighting US patent no. 5,149,191
19. Portable traffic signal photometer US patent no. 5,185,637
20. Wall and ceiling lighting unit US patent no. 5,278,737
21. Improved floodlight reflector US patent no. 4,709,312
22. High efficiency specular louver US patent no. 4,059,754

Expert Witness Services

25 years of experience working for plaintiff and defense, including numerous depositions. State and federal court testimony.

Consulting, visibility reconstruction, light measurement, standards interpretation. Prior art research and patent validity analysis. Scientific and technical matters related to light, vision and lighting equipment.

Casework includes:

- Traffic accidents: pedestrians, bicycles, automobiles, tractor-trailers
- Trip and fall accidents
- Assault and murder
- Photography and visibility representation
- Patent infringement
- Restriction of trade
- Breach of contract

References and details of recent casework available on request.

STATEMENT OF IAN LEWIN

EXHIBIT B

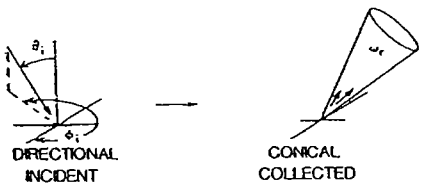
8TH EDITION

LIGHTING HANDBOOK

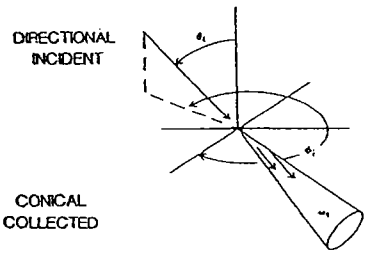
REFERENCE & APPLICATION

ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA

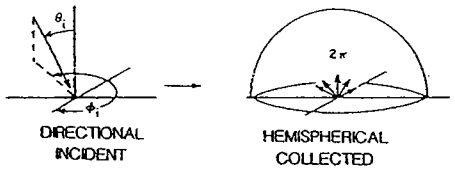
directional-conical reflectance, $\rho(\theta_i, \phi_i; \omega_r)$ the ratio of reflected flux collected through a conical solid angle to essentially collimated incident flux.
Note The direction of incidence must be specified, as must the direction and extent of the cone.



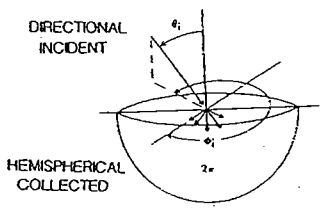
directional-conical transmittance, $\tau(\theta_i, \phi_i; \omega_r)$ the ratio of transmitted flux collected through a conical solid angle to essentially collimated incident flux.
Note The direction of incidence must be specified, as must the direction and extent of the cone.



directional-hemispherical reflectance, $\rho(\theta_i, \phi_i; 2\pi)$ the ratio of reflected flux collected over the entire hemisphere to essentially collimated incident flux.
Note The direction of incidence must be specified.



directional-hemispherical transmittance, $\tau(\theta_i, \phi_i; 2\pi)$ the ratio of transmitted flux collected over the entire hemisphere to essentially collimated incident flux.
Note The direction of incidence must be specified.



directional lighting lighting provided on the workplane or on an object predominantly from a preferred direction. See *accent lighting*, *key light* and *cross light*.

disability glare the effect of stray light in the eye whereby visibility and visual performance are reduced. A direct glare source that produces discomfort may also produce disability glare by introducing a measurable amount of stray light in the eye.

disability glare factor (DGF) a measure of the visibility of a task in a given lighting installation in comparison with its visibility under reference lighting conditions, expressed in terms of the ratio of luminance contrasts having an equivalent effect upon task visibility. The definition of the DGF takes account of the equivalent veiling luminance produced in the eye by the pattern of luminances in the task surround.

discomfort glare glare producing discomfort. It does not necessarily interfere with visual performance or visibility.

discomfort glare factor the numerical assessment of the capacity of a single source of brightness, such as a luminaire, in a given visual environment for producing discomfort (this term is obsolete and is retained only for reference and literature searches). See *glare* and *discomfort glare*.

discomfort glare rating (DGR) a numerical assessment of the capacity of a number of sources of luminance, such as luminaires, in a given visual environment for producing discomfort. It is the net effect of the individual values of the index of sensation for all luminous areas in the field of view. See *discomfort glare factor*. See also chapter 9, Lighting Calculations.

distal stimuli any of the points, lines and surfaces and three-dimensional arrays of scattering particles which one can identify in the physical space in front of the eye and which form optical images on the retina. Each element of a surface or volume to which an eye is exposed subtends a solid angle at the entrance pupil. Such elements of solid angle make up the field of view, and each has a specifiable luminance and chromaticity. Points and lines are specific cases which have to be dealt with in terms of total intensity and intensity per unit length.

distribution temperature (of a light source) the absolute temperature of a blackbody whose relative spectral distribution is most nearly the same in the visible region of the spectrum as that of the light source.

dominant wavelength (of a light), λ_d the wavelength of radiant energy of a single frequency that, when combined in suitable proportion with the radiant energy of a reference standard, matches the color of the light. See *complementary wavelength*.

downlight a small direct lighting unit which directs the light downward and can be recessed, surface mounted or suspended.

downward component that portion of the luminous flux from a luminaire emitted at angles below the horizontal. See *upward component*.

driving beam See *upper (driving) beams*.

dual headlighting system headlighting by means of two double units, one mounted on each side of the front end of a vehicle. Each unit consists of two sealed beam lamps mounted in a single housing. The upper or outer lamps may have two filaments supplying the lower beam and part of the upper beam, respectively. The lower or inner lamps have one filament providing the primary source of light for the upper beam.

solid angles. These concepts must be applied with care if the area of the transmitting element is not large compared to its thickness, in view of internal transmission across the boundary of the area. For many geometrically specified transmittance properties it is assumed that the radiance (luminance) is isotropic over the specified solid angle of incidence. Otherwise, the property is a function of the directional distribution of incident radiance (luminance) as well as the beam geometry and the character of the transmitting surfaces or media. Most transmittance quantities are applicable only to the transmittance of thin films with negligible internal scattering, so that the transmitted radiation emerges from a point that is not significantly separated from the point of incidence of the incident ray that produces the transmitted ray or rays. The governing considerations are similar to those for application of the bidirectional reflectance distribution function (BRDF), rather than the bidirectional scattering-surface reflectance distribution function (BSSRDF).

transverse roadway line (TRL) any line across a roadway that is perpendicular to the curb line.

tristimulus values of a light, X, Y, Z the amounts of each of three specific primaries required to match the color of the light.

troffer a recessed lighting unit, usually long and installed with the opening flush with the ceiling. The term is derived from "trough" and "coffer."

troland a unit of retinal illuminance which is based upon the fact that retinal illuminance is proportional to the product of the luminance of the distal stimulus and the area of entrance pupil. One troland is the retinal illuminance produced when the luminance of the distal stimulus is 1 cd/m^2 and the area of the pupil is 1 mm^2.

Note The troland makes no allowance for interocular attenuation or for the Stiles-Crawford effect.

tube See *lamp*.

tungsten-halogen lamp a gas-filled tungsten incandescent lamp containing a certain proportion of halogens in an inert gas whose pressure exceeds 3 atm.

Note The tungsten-iodine lamp (U.K.) and quartz-iodine lamp (U.S.) belong to this category.

turn signal operating unit that part of a signal system by which the operator of a vehicle indicates the direction a turn will be made, usually by a flashing light.

U

ultraviolet lamp a lamp which radiates a significant portion of its radiative power in the ultraviolet (UV) part of the spectrum; the visible radiation is not of principal interest.

ultraviolet radiation for practical purposes any radiant energy within the wavelength range 10–380 nm. See *regions of the electromagnetic spectrum*.

Note On the basis of practical applications and the effect obtained, the ultraviolet region often is divided into the following bands:

Ozone-producing	180–220 nm
Bactericidal (germicidal)	220–300 nm
Erythemal	280–320 nm

There are no sharp demarcations between these bands, the indicated effects usually being produced to a lesser extent by longer and shorter wavelengths. For engineering purposes, the "black light" region extends slightly into the visible portion of the spectrum. Another division of the ultraviolet spectrum often used by photobiologists is given by the CIE:

UV-A	315–400 nm
UV-B	280–315 nm
UV-C	100–280 nm

units of luminance† the luminance of a surface in a specified direction may be expressed as luminous intensity per unit of projected area of surface or as luminous flux per unit of solid angle and per unit of projected surface area.

Note Typical units are the cd/m^2 [$lm/(sr \cdot m^2)$] and the cd/ft^2 [$lm/(sr \cdot ft^2)$]. The luminance of a surface in a specified direction is also expressed (incorrectly) in lambertian units as the number of lumens per unit area that would leave the surface *if the luminance in all directions within the hemisphere on the side of the surface being considered were the same as the luminance in the specified direction*. A typical unit in this system is the footlambert (fL), equal to 1 lm/ft^2. This method of specifying luminance is equivalent to stating the number of lumens that would leave the surface *if the surface were replaced by a perfectly diffusing surface with a luminance in all directions within the hemisphere equal to the luminance of the actual surface in the direction specified*. In practice no surface follows exactly the cosine formula of emission or reflection; hence the luminance is not uniform, but varies with the angle from which it is viewed. For this reason, this practice is denigrated.

unrecoverable light loss factors See *nonrecoverable light loss factors*.

upper (driving) beams one or more beams intended for distant illumination and for use on the open highway when not meeting other vehicles. Formerly "country beams." See *lower (passing) beams*.

upward component that portion of the luminous flux from a luminaire emitted at angles above the horizontal. See *downward component*.

utilance See *room utilization factor*.

V

vacuum lamp an incandescent lamp in which the filament operates in an evacuated bulb.

valance a longitudinal shielding member mounted across the top of a window or along a wall and usually parallel to the wall, to conceal light sources giving both upward and downward distributions.

valance lighting lighting comprising light sources shielded by a panel parallel to the wall at the top of a window.

values of spectral luminous efficiency for photopic vision, V(l) values for spectral luminous efficiency at 10-nm intervals (see chapter 1, Light and Optics) were provisionally adopted by the CIE in 1924 and were adopted in 1933 by the International Committee on Weights and Measures as a basis for the establishment of photometric standards of types of sources differing from the primary standard in

STATEMENT OF IAN LEWIN

EXHIBIT C

June 19, 1951 N. J. McDAID 2,557,129

SPOTLIGHTING UNIT

Filed June 1, 1948

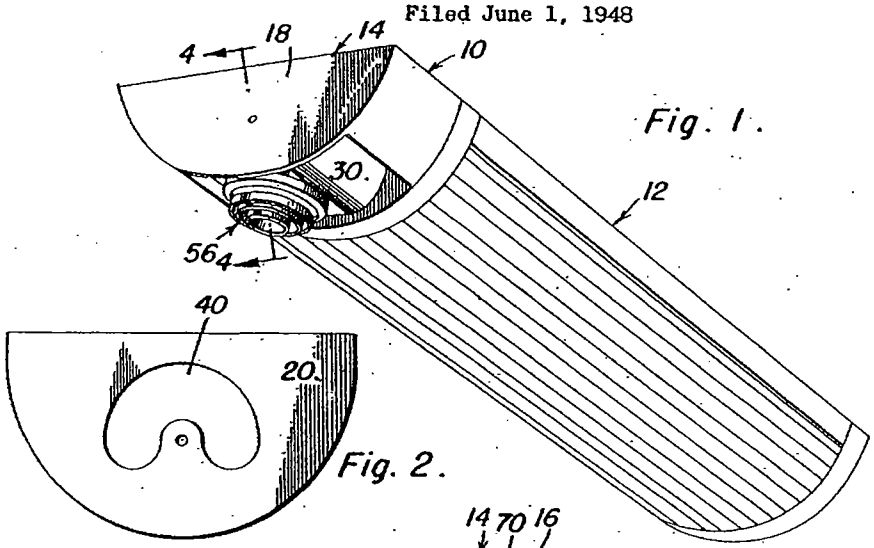


Fig. 1.

Fig. 2.

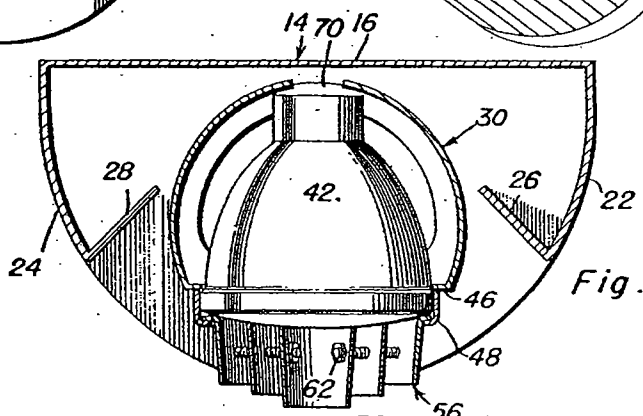


Fig. 3.

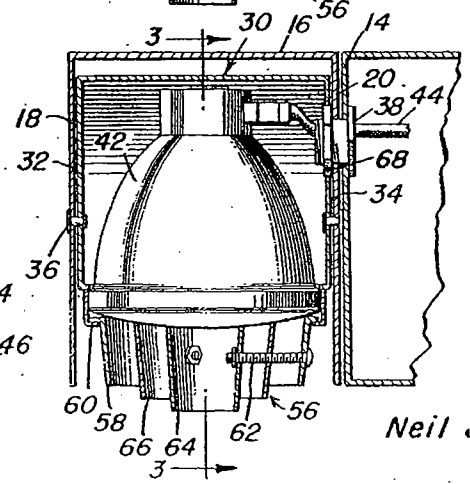
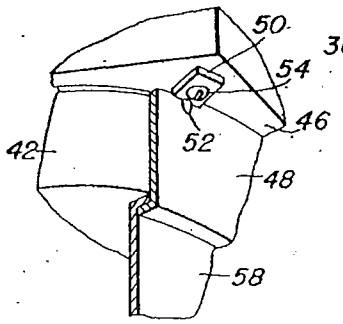


Fig. 4.

Fig. 5.



Neil J. McDaid
INVENTOR.

BY Thomas A. O'Brien and Harvey B. Jacobson
Attorneys

Patented June 19, 1951 2,557,129

UNITED STATES PATENT OFFICE

2,557,129

SPOT LIGHTING UNIT

Neil J. McDaid, Charleston, S. C., assignor of ten per cent to Toole-Woodward Engineering Company, Charleston, S. C.

Application June 1, 1948, Serial No. 30,492

1 Claim. (Cl. 240—78)

1

This invention relates generally to new and useful improvements in spotlighting fixtures and has for its primary object to provide a novel and compact spotlighting fixture, which is adapted for attachment to a suspension or ceiling type fixture.

Another important object of this invention is to provide a spotlighting fixture for use in association with a ceiling type fixture, the spotlighting fixture being easily and conveniently installed on the ceiling type fixture, in operative association therewith.

Another object of this invention is to provide a spotlight unit, which is adapted for attachment to a suspension or ceiling type fixture and which is pivotally installed thereon, so as to be adjustable and to project its beam in various selected directions.

A meritorious feature of this invention resides in the provision of a pivotally mounted spotlighting fixture, which is pivotally installed on a ceiling type fixture, so that the spotlight can be readily and easily focussed in any desired direction from the floor by any suitable long instrument.

Another meritorious feature of this invention resides in the provision of an outer shell, which is rigidly secured to one end of a fluorescent luminary or to any type of suspension type fixture and which is adapted to pivotally house an inner shell, the inner shell serving to support a lamp.

Another important feature of this invention resides in the provision of means for mounting the outer shell to the end of a fluorescent luminary or the like suspension type fixture, the securing or mounting means serving as a communicating means for wiring a spotlight in the main light or fixture circuit.

These and ancillary objects and other meritorious features are attained by this invention, a preferred embodiment of which is set forth in the following description and illustrated in the accompanying drawings, wherein:

Figure 1 is a view in perspective of a fluorescent luminary, showing this invention in operative attachment thereto;

Figure 2 is a side elevational view of one side of the outer shell;

Figure 3 is a vertical longitudinal sectional view of this invention as taken substantially along the plane of line 3—3 in Figure 4;

Figure 4 is a vertical transverse sectional view of this invention as taken substantially along the plane of line 4—4 in Figure 1, and

2

Figure 5 is an enlarged fragmentary view of the means provided for attaching a lamp supporting ring to the inner shell.

Referring now more particularly to the drawings, wherein similar characters of reference designate corresponding parts throughout, this invention, generally designated by the character reference 10, is shown in operative attachment with a conventional fluorescent luminary 12. However, it is to be noted that this invention is adaptable for use in association with any type of suspension or ceiling type fixture, the same being shown in the drawings by way of example only.

The fluorescent luminary 12 has a pair of opposed depending arcuate ends 14, to which this invention may be easily attached, either on one or both ends, as desired. The semi-circular end caps 14 of the fluorescent luminaries may be utilized, depending upon the spotlighting requirements of the establishment. In the case where only one unit is attached, the unsummetrical effect of the added unit will not be easily noticed, due to the small over-all length of the spotlighting unit 10, as compared to the large length of the fluorescent luminary.

This invention comprises an outer shell 14, having a rectangular top 16 and semi-circular or arcuate end caps 18 and 20, which depend therefrom. Opposed arcuately inturned end sections 22 and 24 terminate in upwardly extending baffles 26 and 28. Pivotally mounted within the outer shell 14 is an inner shell 30. The inner shell 30 is of a substantially similar shape, having opposed arcuate sides 32 and 34. The sides 32 and 34 are riveted to the sides 18 and 20 of the outer shell, as at 36. However, it is to be apparent that similar or other pivotal attaching means may be employed for securing the two shells together, so that the inner shell is capable of defining an arcuate path of travel within the outer shell, the outer shell being rigidly attached to the fluorescent luminary or ceiling fixture. Suitable means may be provided for securing the spotlighting unit 10 to the end cap 14 of the fluorescent luminary and comprises a nipple 38, which rigidly secures the end cap 20 to the end of the luminary, the nipple being inserted in a knockout area 40. However, an arcuate slot or guide-way 68 is formed in the side 34 of the inner shell, the projected end of the nipple travelling within the slot or guide-way 68.

Means is provided for mounting a conventional lamp 42 within the inner shell, the lamp 42 being wired in the circuit of the fluorescent luminary through the medium of a lead wire 44. The

conducting or lead wire 44 extends through the nipple 38, as shown in Figure 4 of the drawings. The means preferred for mounting the lamp comprises the formation of a circular opening in the substantially flat bottom portion of the inner shell 30, the opening defining an inwardly directed flange 46 on the bottom of the inner shell. A lamp supporting ring 48 is suitably secured to the flange 46 of the inner shell by any suitable securing or attachment means. By way of example, an angle clip 50 has one side 52 welded to the ring 48, the opposite side of the angle clip having an attaching aperture 54. Metal screws are employed in association with the attaching apertures 54 and suitable apertures formed in the flange 46 to secure the clip to the inner shell.

A plurality of nested louvres 56 are carried by the supporting ring 48 and disposed in vertical alignment with the seated lens face of the lamp 42. The outer louvre 58 has an attaching flange 60, which is seated on the inwardly directed flanged end of the lamp supporting ring 48. Suitable securing means 62 is provided to attach the circular inner nested louvres 66 and 64 to the outer supporting louvre 58, as shown more particularly in Figures 3 and 4 of the drawings.

Thus, it can be seen that the inner shell 30 is free to turn forty-five degrees, right or left, on a horizontal axis. Suitable control means for accomplishing the adjustment of the beam direction may be employed and preferably, would be employed by a person from a floor supported position. A stick or pole or similar instrument may be employed to exert pressure on one side of the inner shell, until the desired angle is obtained. No mechanical stop or locking device is required to hold the lamp at the desired angle, as the center of gravity pivot of the inner shell enables the entire inner assembly to be swung back and forth very easily and conveniently, the construction requiring but a bare minimum of tension in order to remain in the position it is placed.

In order to allow the heat emanating from the lamp to be exhausted into the outer shell, an opening 70 is formed in the top portion of the inner shell defining a communicating passage between the inner and outer shell.

Thus, it can be appreciated that there has been provided a compact and efficient attachment for a suspension type fixture, of fluorescent or other structure, which can be easily and conveniently adjusted from a floor position and which, in such adjustment, will remain fixed in the adjusted position.

However, since many other purposes and objects of this invention will become apparent to those skilled in the art, upon a perusal of the foregoing description, in view of the accompanying drawings, it is to be understood that certain changes may be effected thereon, as coming within the spirit of the invention and the scope of the appended claim.

Having described the invention what is claimed as new is:

A spotlight fixture adapted for attachment to a ceiling light fixture comprising an outer shell, said outer shell including a rectangular top plate, extending opposed arcuate sides and arcuately inturned ends, an inner shell, of similar shape pivotally mounted to the sides of the outer shell, baffles formed on the ends of the outer shell and projecting upwardly between the shells, a circular ring secured to the open end of the inner shell, a lamp disposed within the inner shell and having a lens face seated on the ring, nested louvres suspended from the ring in vertical alignment with the lens face of the lamp, aligned openings in one of the sides of the shells, means disposed in the openings for attaching the shells to a ceiling light fixture, said inner shell being movable about the attaching means and an opening in the inner shell for exhausting heat into the outer shell.

NEIL J. McDAID.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,498,580	Rule	June 24, 1924
2,022,222	Sullivan	Nov. 26, 1935
2,063,744	Kramer	Dec. 8, 1936
2,152,197	Levy	Mar. 28, 1939
2,300,523	Reichert	Nov. 3, 1942
2,313,131	Elias	Mar. 9, 1943

STATEMENT OF IAN LEWIN

EXHIBIT D

United States Patent [19]

Miller

[11] **Patent Number: 4,816,969**

[45] **Date of Patent: Mar. 28, 1989**

[54] **WALL-MOUNTED OVER-BED LIGHTING FIXTURE**

[75] Inventor: **David H. Miller, Walnut Creek, Calif.**

[73] Assignee: **Hospital Systems Inc., Oakland, Calif.**

[21] Appl. No.: 149,473

[22] Filed: **Feb. 5, 1988**

[51] Int. Cl.[4] **A47B 23/06**

[52] U.S. Cl. **362/130**; 362/801; 362/282; 362/287; 362/394

[58] Field of Search 362/130, 147, 223, 224, 362/225, 217, 234, 244, 245, 260, 277, 282, 283, 319, 322, 285, 287, 801, 35, 455, 394, 269, 275; 128/23

[56] **References Cited**

U.S. PATENT DOCUMENTS

1,298,362	3/1919	Lewry	362/130
1,739,337	12/1929	Von Canon et al.	362/130
1,906,626	5/1933	Kramer	362/130
3,022,416	2/1962	Roberts	362/245
4,149,222	4/1979	Linde	362/394
4,680,684	7/1987	Wolber	362/130

FOREIGN PATENT DOCUMENTS

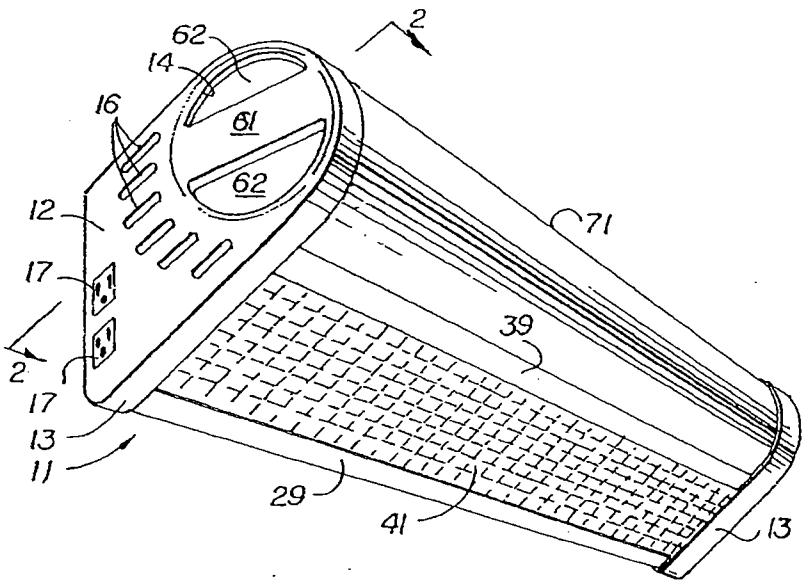
110770	12/1939	Australia	362/130
2395460	2/1979	France	362/225

Primary Examiner—Michael Koczo
Assistant Examiner—D. M. Cox
Attorney, Agent, or Firm—Julian Caplan

[57] **ABSTRACT**

The housing for the fixture is mounted on a wall over the patient's bed. The housing accommodates a first non-rotatable fixture which directs light from fluorescent tubes downward through a conventional flat prismatic lens. There is also a longitudinally extending lens mounted within the outline of the housing and rotatable by means of handles at either end so that light from a second set of fluorescent tubes may be adjusted to function as a reading lamp for the patient, as an examining light at different locations of the patient's body and as a room illumination source, the intensity of room illumination being adjustable. A safety switch is moved to "off" position when the housing is struck by an object such as an IV rod fixed to an adjustable bed to stop the motor which moves the bed.

11 Claims, 3 Drawing Sheets



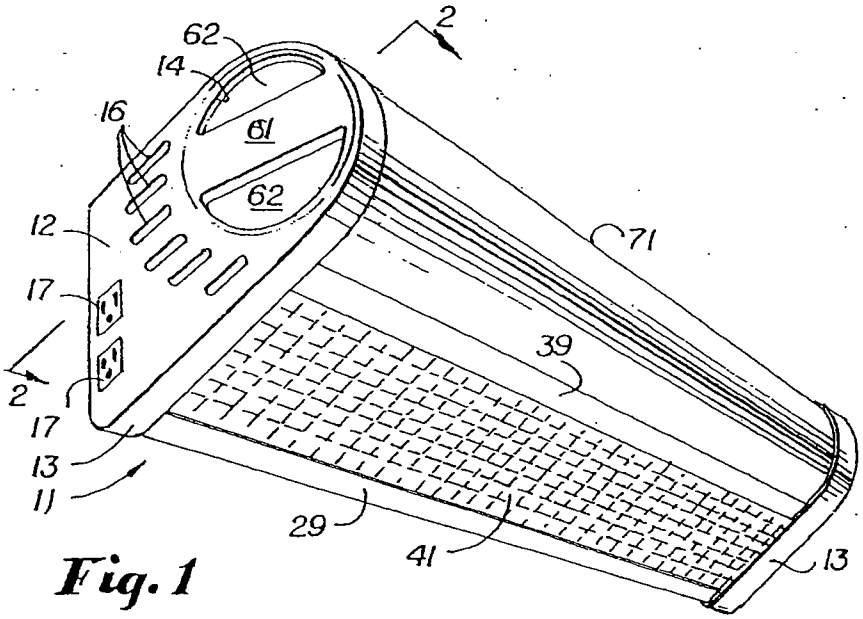


Fig. 1

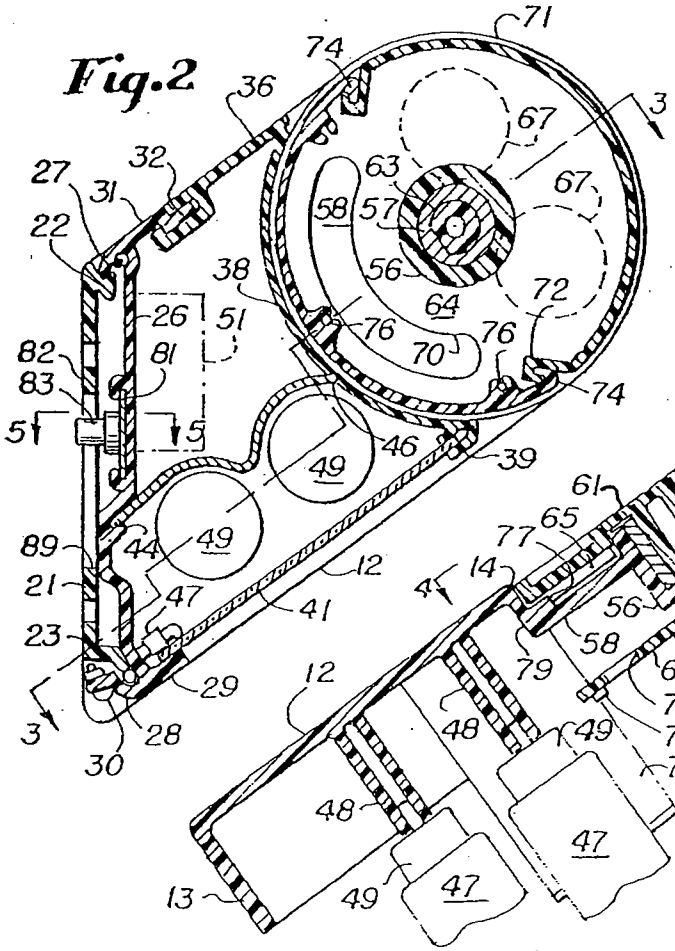


Fig.2

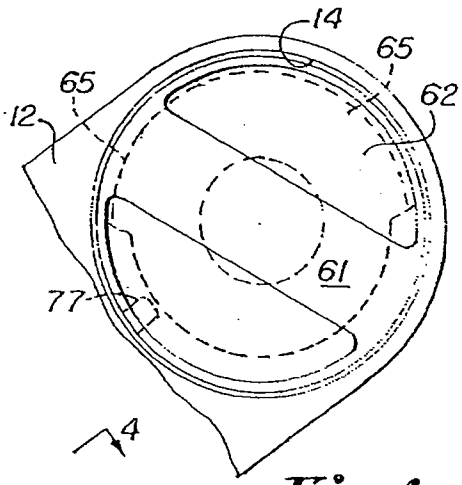


Fig.4

Fig. 3

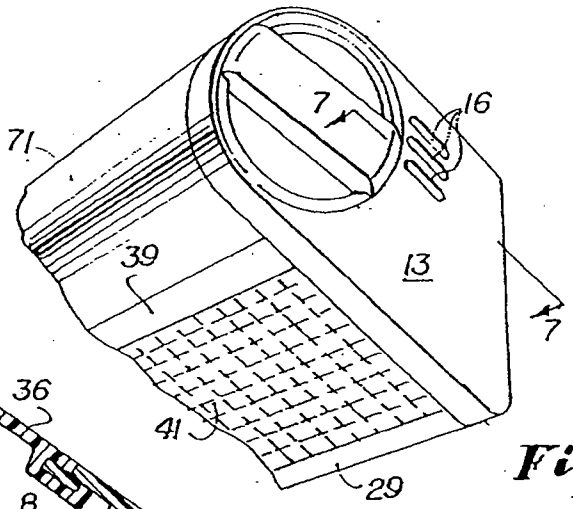


Fig.6

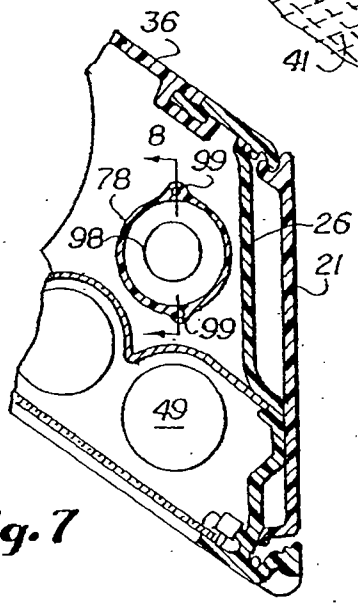


Fig.7

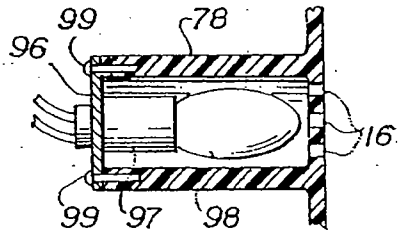


Fig.8

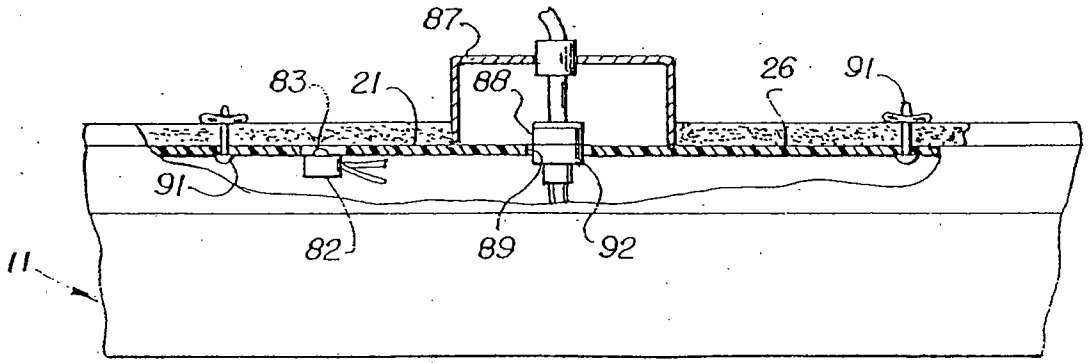


Fig.5

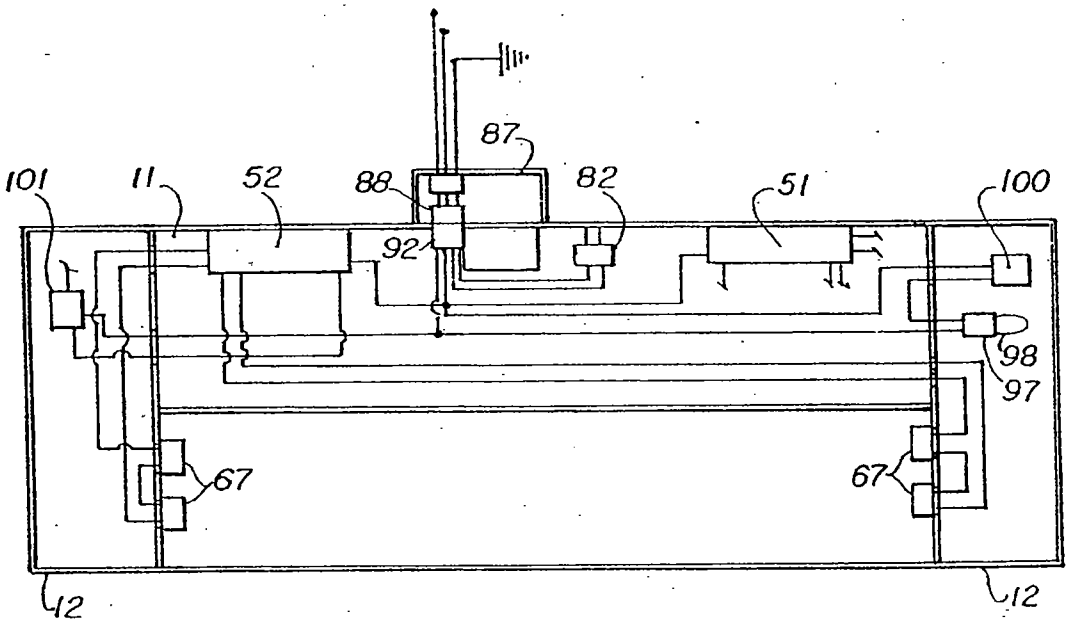

101
11
52
88
87
82
51
100
92
98
97
67
67
12
12

Fig.9

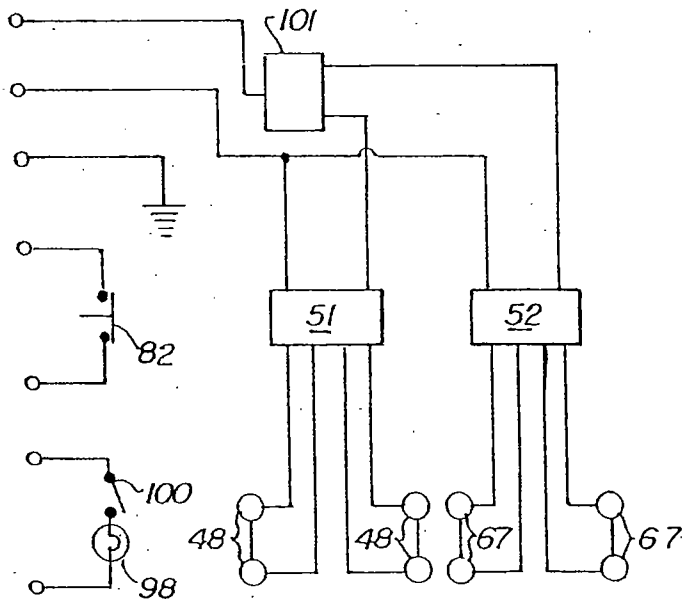

101
51
52
82
100
98
48
48
67
67

Fig.10

WALL-MOUNTED OVER-BED LIGHTING FIXTURE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a wall-mounted over-bed hospital lighting fixture of the type which provides illumination of the head of the bed and is characterized by the provision of a rotatable lamp incorporated in the housing of the device which may be used as a patient reading lamp, as a physician's examining lamp and also as a variable room illumination lamp.

2. Description of Related Art

Wall-mounted bed lighting fixtures are well known in the art. Such fixtures generally have a horizontal flat prismatic lens through which illumination from the interior of the housing is directed to the head of the bed which is mounted immediately therebeneath. The provision of patient examining lights and reading lamps which are mounted on the wall is also well known.

The present invention differs from prior fixtures in that both lighting fixtures are totally enclosed within a wall-mounted housing.

U.S. Pat. No. 3,919,540 discloses a safety light with a switch responsive to interfering movement of an IV rod, or the like, which interrupts power to a bed-elevating motor. U.S. Pat. No. 4,149,222 shows a pivotal wall mounting for a bed light wherein the fixture is hinged to a mounting plate with a leaf hinge. The present invention provides an improved pivotal mounting which does not require a leaf hinge and is more easily installed than prior fixtures of this type. A room may be completely finished and painted before the fixture is set into place, preventing damage to the paint or to the fixture. The bracket then serves as an integral part of the safety interlock.

SUMMARY OF THE INVENTION

A single housing preferably formed of interfitting extrusions is provided which is mounted extending longitudinally horizontally on the wall above a bed and is used in hospitals, nursing homes and the like. On the bottom of the housing is a flat, horizontal, prismatic lens which directs illumination from one or more fluorescent tubes downward to illuminate the head of the bed.

Also mounted on the upper portion of the housing is a rotatable two-part cylinder, one part being transparent and the other opaque and within the cylinder are one or more additional fluorescent lamps. By turning a handle at either end of the housing, the cylindrical member may be directed in various positions. Thus, it may be directed to provide a patient reading lamp. It may also be adjusted so that it illuminates any portion of the bed and may be used by a physician or nurse as an examining lamp. Additionally, the transparent portion of the lamp may be directed toward the ceiling or any portion of the room to provide room illumination. Particularly in connection with the latter function, the amount of illumination may be controlled by exposing or concealing within the housing varying portions of the transparent part of the rotatable member.

The housing may also contain a night light which shines through louvers in the end cap of the housing.

Another feature of the invention is the fact that all of the rotatable elements including the handles which turn the rotatable member are at all times within the outline of the housing so that in none of its various positions of

adjustment does the lamp extend outside the outline of the housing.

An advantage of the invention is the fact that, regardless of the position of adjustment of the rotatable lamp, it is always within the confines of the housing, thereby differing from those overhead reading lamps which are hinged or pivotted to the housing and in down position extend outside the housing.

Another advantage of the invention is that all wires for all lamps are contained within the housing and do not extend exteriorly thereof.

A still further feature of the invention is the provision of a safety interface comprising a switch which cuts off power to an adjustable bed or the like in the event that the bed or an upward-extending member attached to a bed comes in contact with the lighting fixture This safety feature prevents the hospital bed from being torn off the wall if it is wall-mounted and prevents damage to the housing of the fixture The mounting of the fixture to a plate attached to the wall is an improved feature of this invention.

FIGURES IN THE DRAWINGS

FIG. 1 is a perspective view of a fixture in accordance with the present invention.

FIG. 2 is a sectional view taken substantially along the line 2—2 of FIG. 1.

FIG. 3 is a sectional view taken substantially along the line 3—3 of FIG. 2.

FIG. 4 is a fragmentary enlarged end elevation as vised from the right of FIG. 3.

FIG. 5 is a fragmentary plan view showing the fixture mounted on a wall.

FIG. 6 is a perspective view of a portion of the device.

FIG. 7 is a fragmentary sectional view taken substantially along the line 7—7 of FIG. 6.

FIG. 8 is a sectional view along line 8—8 of FIG. 7.

FIG. 9 is a schematic wiring layout of electrical portions of the invention. FIG. 10 is a schemtic wiring diagram of the same.

DESCRIPTION OF PREFERRED EMBODIMENT

Housing 11 has end caps 12 at either end, each end cap 12 having an inward projecting relatively narrow rim 13. A circular hole 14 is formed in each end cap as are louvers 16. Sockets 17 may be recessed into the end caps for attachment of various appliances as desired.

Mounted within the housing 11 and within the confines of the end caps 12 is a longitudinally extending mounting bracket 21 which is fixed to a wall so that the housing 11 extends horizontally longitudinally above the bed. Wall 86 has a conventional junction box 87 recessed therein and extending outward therefrom is a first snap connector member 88. Bracket 21 has a knock-out hole 89 formed therein fitting over junction box 87. Bracket 21 is attached to wall 86 by screws 91. Along the top edge bracket 21 is a top interlock receptor 22 and along the bottom edge is a bottom interlock lug 23. Interfitting with bracket 21 is a longitudinally extending rear member 26 which has a top lug 27 received in receptor 22 and a bottom receptor 28 which receives bottom lug 23 in such manner that when an object such as an IV rod attached to a hospital bed strikes housing 11, rear member 21 pivots upward. Along the bottom of member 26 is an external flange 29 and along the top is a top flange 31 which is formed at

its outer end with an internally offset lug 32. Screws 30 recessed in the lower part of the fixture are tightened to an extent to allow pivoting of top lug 27 on receptor 22 but still contain relative movement to prevent housing 11 from coming away from wall 86. Second snap connector member 92 mates with connector 88 when the members are assembled to supply power to the fixture.

Top member 36 has a top receptor 37 which receives lug 32 so that the members 31 and 26 comprise essentially a unit. Preferably top member 36 extends at an obtuse angle relative to member 21 and at its forward end is formed in an arcuate portion 38. The lower end of arcuate portion 38 comprises a bottom receptor 39. Mounted on the bottom of the housing is a flat prismatic lens 41 which is disposed approximately parallel to the top member 36. The upper end or outer edge of lens 41 is received in receptor 39 and its lower or inner edge is held by an edge clamp 42 connected to external flange 29 of rear member 26. The lens 41 may be removed by release of clamp 42. Above lens 41 is a reflector 43 the edges of which are received in receptors 44 and 46 in rear member 26 and arcuate portion 38, respectively. Fluorescent tubes 47 are held in place by inward extensions 4 end caps 12, the sockets 49 for the tubes 47 in threaded engagement with the hollow extensions 48. It will be understood that the shape of reflector 43 is such as to direct the illumination from the tubes 47 outward through the lens 41. Ballast 51 for tubes 47, shown schematically in FIG. 2, is mounted in the space above the reflectors 43. Various lengths of housing 11 may be used and the proper length tube 47 is chosen for a particular length housing.

Concentric with the center of curvature of arcuate portion 38 is a bearing hub 56 which is integral with end cap 12 and is connected to the end portion thereof by a web 58 and to the upper rim portion 13 thereof by web 59. Within the hub 56 is sleeve bearing 57. It will be noted that the webs 58 and 59 are recessed and fitting within the recess is a rotation handle or knob 61 formed with depressions 62 so that it may be conveniently gripped by a physician, nurse or other attendant to turn the handle 61. Fitting through sleeve bearing 57 is a hollow stem 63 which is an inward extension of handle 61. The inner end of stem 63 is formed non-circular with a flat 69 (see FIG. 4) and is received within an appropriate hole in mounting disk 64. A retaining ring 66 secures the stem 63 and disk 64 together. Attached to disk 64 are one or more sockets 67 to receive fluorescent tubes 68, preferably of the same length as tubes 47. A slot 70 here shown to be arcuate is formed in disk 64 for passage of wiring from the ballast 52 to the sockets 67. Ballast 52 is likewise within housing 11.

A transparent substantially semi-cylindrical rotatable lens 71 is provided having receptors 72 at either edge. Interfitting with lens 71 is a rotatable lens mounting 73 having at either edge lugs 74 which fit into the receptors 72. The members 71 and 73 comprise a cylindrical longitudinally extending member and attachment ears 76 are used to secure the mounting 73 to the disks 64. Arcuate portion 38, handle 61, stem 63, disk 64, lens 71, and lens mounting 73 all have a common center of curvature.

Stops 77 are inserted in wall 79 of opening 14 in cap 12. Handle 61 has a projection 65 which intersects stops 77 and limit the oscillatory movement of lens 71 to less than 360°.

One feature of the invention is the fact that the parts may largely be formed of aluminum alloy extrusions, thereby making the cost of construction relatively inexpensive.

A safety feature of the invention is the provision of a switch which may be opened if a hospital bed or the orthopedic frame above such a bed or an IV rod attached to the bed comes in contact with the fixture. Thus a mounting plate 81 is installed in a suitable socket in the rear member 26. A switch button 83 bears against the mounting bracket 21. If, due to distortion of the housing 11 by reason of contact with a bed or frame above a bed, the button 83 is pressed inward to open the circuit. Switch 82 may be used to discontinue power to the bed operating motor, to sound an alarm or for other purposes.

The fluorescent tubes 47 which provide illumination through the lens 41 illuminate the head of the bed in normal fashion. However, by rotating the handle 61, the transparent rotatable lens 71 may be adjusted in position so that it shines down to provide a reading lamp for the patient or may be turned so that it illuminates any portion of the patient's body for purpose of examination. The lens 71 may be turned upward so that indirect illumination of the room is provided and the degree of such illumination may be adjusted by the relative proportions of the transparent lens 71 and opaque mounting 73 which are exposed outside the arcuate portion 38.

For night-light purposes, a sub housing 78 is formed in end cap 12 adjacent louvers 16. A mounting plate 96 carries socket 97 for lamp 88. Plate 96 is attached to the inner open end of sub-housing 78 by screws 99. Light from lamp 98 shines out through louvers 16.

As previously stated, all wiring is confined within the housing 11. The wiring diagram for the fluorescent lamps 47 and 68 and for switch 82 is shown in FIG. 10. FIG. 9 shows schematically how the wiring and ballasts 51, 52 are disposed within the housing. A four-position switch 101 controls current entering the system from connector 92 to ballasts 51 and 52 for lamps 47 and 68, respectively, so that either set of lamps or both or neither may be illuminated by adjustment of switch 101, which is accessible from the exterior through an opening (not shown) in one of end caps 12. A toggle switch 100, also accessible from the exterior, controls night lamp 98.

What is claimed is:

1. An over-bed hospital lighting fixture comprising a longitudinally disposed housing having mounting means for mounting said housing on a wall,

end caps on either end of said housing formed with aligned circular openings,

a cylindrically arcuate member positioned in said housing outward of said mounting means and transverse to said end caps having its center of curvature substantially co-extensive with the center of curvature of said circular openings and disposed longitudinally of said housing,

a substantially semi-cylindrical, substantially opaque lens mounting rotatable about an axis concentric with said center of curvature and having first connecting means along its longitudinal edges,

a substantially semi-cylindrical, transparent lens with its axis substantially co-extensive with said center of curvature and having second connecting means along its longitudinal edges cooperable with said first connecting means to combine said lens mounting and said lens as a cylindrical unit,

a pair of mounting disks connected adjacent either end of said housing for rotation with said cylindri-

cal unit and having light sockets to receive light bulbs,

a handle at at least one end of said housing having a shaft passing through said circular opening and connected for rotation with said lens mounting, said lens and said mounting disk,

whereby by turning said handle the relative amount of light passing out of said housing through said lens may be adjusted.

2. A fixture according to claim 1 which further comprises a flat transparent bottom wall for said housing interposed between said mounting means and said arcuate member, a reflector inward of said bottom wall, lighting means between said reflector and said bottom wall and means for mounting said bottom wall, said reflector and said lighting means in said housing.

3. A fixture according to claim 2 in which said bottom wall comprises a substantially rectangular prismatic lens.

4. A fixture according to claim 3 in which said lighting means comprises longitudinally disposed fluorescent tubes.

5. A fixture according to claim 1 which further comprises a fluorescent tube longitudinally disposed in said housing having its opposite ends received in said sockets of said disks.

6. A fixture according to claim 1 in which each said end cap is formed with an indented annular web having a bearing housing concentric with said axis, said handle being recessed in said annular web, said handle having a stem passing through said web and connected inside said web to one said disk and to said lens mounting and said lens.

7. A fixture according to claim 1 which further comprises a rear member within said housing normally disposed substantially parallel to said mounting means,

a safety limit switch carried by said rear member having a button resiliently biased outward toward a first position, said button being moved to a second position by said button engaging said mounting means when said rear member is disposed substantially parallel to said mounting means whereby force applied to said housing by an external object striking said housing causes said rear member to pivot outward away from said mounting means said button to move to first position, when said force is sufficient to damage said fixture or said external object.

8. A fixture according to claim 7 in which said mounting means is formed with a horizontal longitudinally extending interlock receptor along its top edge and said rear member is formed with a top lug fitting into said receptor so that said housing hangs from said receptor and may pivot upward relative to said mounting means.

9. A fixture according to claim 8 which further comprises adjustment screws in said housing engaging the bottom edge of said mounting means, said screws controlling the extent of pivotal movement of said rear member relative to said mounting means.

10. A fixture according to claim 8 in which said mounting means is formed with an opening for protrusion of a first electrical connector for power for said fixture, said housing having a second electrical connector mating with said first connector, whereby said fixture may be placed on a wall by first attaching said mounting means to said wall, then hanging said top lug on said receptor and engaging said first and second connectors and then pivoting said housing down so that said rear member is substantially flush with said mounting means.

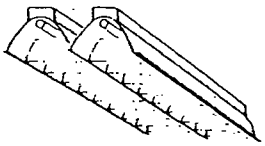
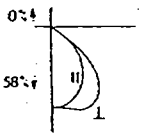
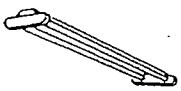
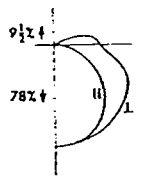
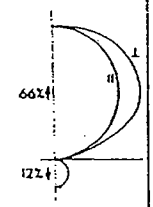
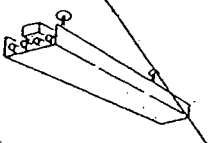
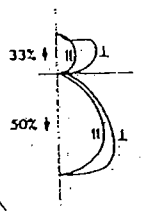
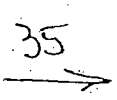
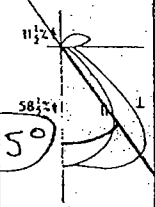
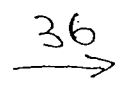
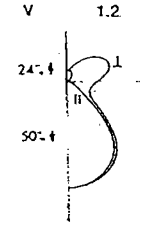
11. A fixture according to claim 1 in which said arcuate member, opaque lens mounting, lens, and mounting disks are at all times confined within said housing regardless of the position of adjustment of said lens.

* * * * *

STATEMENT OF IAN LEWIN

EXHIBIT E

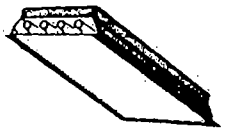
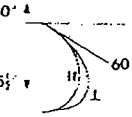
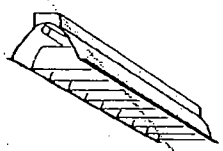
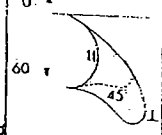
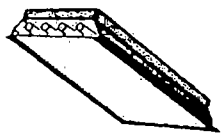
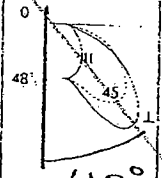
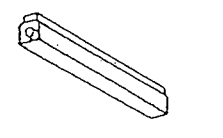
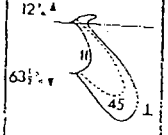
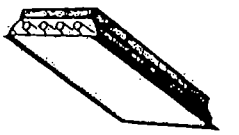
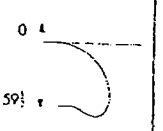
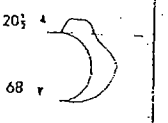
Fig. 9-34. *Continued*

Typical Luminaire	Typical Intensity Distribution and Per Cent Lamp Lumens	ρ_{CC} →	80			70			50			30			10			0	WDRC	ρ_{CC} →
		ρ_W →	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0		ρ_W →
	Maint. Cat. SC	RCR ↓	Coefficients of Utilization for 20 Per Cent Effective Floor Cavity Reflectance (ρ_{FC} = 20)																	RCR ↓
31  150 mm × 150 mm (6 × 6") cell parabolic wedge louver—multiply by 1.1 for 250 × 250 mm (10 × 10") cells	IV 1.5/1.2 	0	.69	.69	.69	.67	.67	.67	.64	.64	.64	.62	.62	.62	.59	.59	.59	.58		
		1	.62	.61	.59	.61	.59	.58	.59	.57	.56	.57	.55	.54	.55	.54	.53	.52	.159	1
		2	.56	.53	.50	.55	.52	.50	.53	.50	.48	.51	.49	.47	.49	.48	.46	.45	.160	2
		3	.50	.46	.43	.49	.46	.43	.48	.44	.42	.46	.43	.41	.45	.42	.41	.39	.155	3
		4	.45	.41	.37	.44	.40	.37	.43	.39	.36	.42	.38	.36	.40	.38	.36	.34	.147	4
		5	.40	.36	.32	.40	.36	.32	.39	.35	.32	.38	.34	.32	.37	.34	.31	.30	.139	5
		6	.37	.32	.29	.36	.32	.28	.35	.31	.28	.34	.31	.28	.33	.30	.28	.27	.131	6
		7	.33	.29	.25	.33	.28	.25	.32	.28	.25	.31	.28	.25	.30	.27	.25	.24	.123	7
		8	.30	.26	.23	.30	.26	.22	.29	.25	.22	.28	.25	.22	.28	.25	.22	.21	.115	8
		9	.28	.23	.20	.27	.23	.20	.27	.23	.20	.26	.23	.20	.26	.22	.20	.19	.109	9
		10	.26	.21	.18	.25	.21	.18	.25	.21	.18	.24	.21	.18	.24	.20	.18	.17	.102	10
32  2-lamp, surface mounted, bare lamp unit—photometry with 460 mm (18") wide panel above luminaire—lamps on 150 mm (6") centers	I 1.3 	0	1.02	1.02	1.02	.99	.99	.99	.92	.92	.92	.86	.86	.86	.81	.81	.81	.78		
		1	.85	.80	.76	.82	.78	.74	.76	.73	.70	.71	.68	.66	.67	.64	.62	.60	.467	1
		2	.72	.65	.59	.70	.63	.58	.65	.60	.55	.61	.56	.52	.57	.53	.50	.47	.387	2
		3	.63	.55	.48	.60	.53	.47	.56	.50	.45	.53	.47	.43	.49	.45	.41	.38	.331	3
		4	.55	.46	.40	.53	.45	.39	.50	.43	.37	.46	.41	.36	.43	.38	.34	.32	.289	4
		5	.49	.40	.34	.47	.39	.33	.44	.37	.32	.41	.35	.31	.39	.34	.29	.27	.255	5
		6	.43	.35	.29	.42	.34	.29	.40	.33	.28	.37	.31	.27	.35	.30	.26	.23	.228	6
		7	.39	.31	.25	.38	.30	.25	.36	.29	.24	.34	.28	.23	.32	.26	.22	.20	.206	7
		8	.36	.28	.22	.35	.27	.22	.33	.26	.21	.31	.25	.21	.29	.24	.20	.18	.188	8
		9	.33	.25	.20	.32	.25	.20	.30	.24	.19	.28	.23	.18	.27	.22	.18	.16	.173	9
		10	.30	.23	.18	.29	.22	.18	.28	.21	.17	.26	.21	.17	.25	.20	.16	.14	.159	10
33  Luminous bottom suspended unit with extra-high output lamp	VI N.A. 	0	.77	.77	.77	.68	.68	.68	.50	.50	.50	.34	.34	.34	.19	.19	.19	.12		
		1	.67	.64	.61	.59	.56	.54	.43	.42	.41	.29	.29	.28	.17	.16	.16	.10	.048	1
		2	.58	.54	.50	.51	.48	.44	.38	.36	.34	.26	.24	.23	.14	.14	.13	.08	.045	2
		3	.51	.46	.42	.45	.41	.37	.33	.30	.28	.23	.21	.19	.13	.12	.11	.07	.041	3
		4	.45	.39	.35	.40	.35	.31	.30	.26	.24	.20	.18	.17	.11	.10	.10	.06	.037	4
		5	.40	.34	.30	.35	.30	.26	.26	.23	.20	.18	.16	.14	.10	.09	.08	.05	.034	5
		6	.36	.30	.25	.31	.26	.23	.24	.20	.17	.16	.14	.12	.09	.08	.07	.04	.031	6
		7	.32	.26	.22	.28	.23	.20	.21	.18	.15	.15	.12	.11	.08	.07	.06	.04	.028	7
		8	.29	.23	.19	.26	.21	.17	.19	.16	.13	.13	.11	.09	.08	.06	.06	.03	.026	8
		9	.26	.21	.17	.23	.18	.15	.17	.14	.12	.12	.10	.08	.07	.06	.05	.03	.024	9
		10	.24	.19	.15	.21	.17	.13	.16	.13	.10	.11	.09	.07	.06	.05	.04	.03	.022	10
34  Prismatic bottom and sides, open top, 4-lamp suspended unit—see note 7	VI 1.4/1.2 	0	.91	.91	.91	.85	.85	.85	.74	.74	.74	.64	.64	.64	.54	.54	.54	.50		
		1	.80	.77	.74	.75	.72	.70	.65	.63	.61	.57	.55	.54	.49	.47	.47	.43	.179	1
		2	.70	.65	.61	.66	.62	.58	.58	.54	.52	.50	.48	.46	.43	.42	.40	.37	.166	2
		3	.62	.56	.51	.58	.53	.49	.51	.47	.44	.45	.42	.39	.39	.37	.35	.32	.153	3
		4	.55	.49	.44	.52	.46	.42	.46	.41	.38	.40	.37	.34	.35	.32	.30	.27	.140	4
		5	.50	.43	.38	.47	.41	.36	.41	.37	.33	.36	.33	.30	.32	.29	.26	.24	.129	5
		6	.45	.38	.33	.42	.36	.32	.37	.33	.29	.33	.29	.26	.29	.26	.23	.21	.119	6
		7	.40	.34	.29	.38	.32	.28	.34	.29	.26	.30	.26	.23	.26	.23	.21	.19	.111	7
		8	.37	.30	.26	.35	.29	.25	.31	.26	.23	.28	.24	.21	.24	.21	.19	.17	.103	8
		9	.34	.27	.23	.32	.26	.22	.29	.24	.21	.25	.22	.19	.22	.19	.17	.15	.096	9
		10	.31	.25	.21	.29	.24	.20	.26	.22	.19	.23	.20	.17	.21	.18	.15	.14	.090	10
35  2-lamp prismatic wraparound—see note 7	V 1.5/1.2 	0	.81	.81	.81	.78	.78	.78	.72	.72	.72	.66	.66	.66	.61	.61	.61	.59		
		1	.71	.68	.66	.68	.66	.63	.63	.61	.59	.58	.57	.56	.54	.53	.52	.50	.223	1
		2	.63	.58	.55	.60	.56	.53	.56	.53	.50	.52	.50	.47	.48	.46	.45	.43	.201	2
		3	.56	.50	.46	.54	.49	.45	.50	.46	.43	.47	.43	.41	.43	.41	.39	.37	.183	3
		4	.50	.44	.40	.48	.43	.39	.45	.40	.37	.42	.38	.35	.39	.36	.34	.32	.167	4
		5	.45	.39	.34	.43	.38	.34	.40	.36	.32	.38	.34	.31	.35	.32	.30	.28	.153	5
		6	.40	.34	.30	.39	.34	.30	.37	.32	.28	.34	.30	.27	.32	.29	.26	.25	.142	6
		7	.37	.31	.27	.35	.30	.26	.33	.29	.25	.31	.27	.24	.30	.26	.23	.22	.131	7
		8	.33	.28	.24	.32	.27	.23	.30	.26	.23	.29	.25	.22	.27	.24	.21	.20	.122	8
		9	.31	.25	.21	.30	.25	.21	.28	.24	.20	.26	.23	.20	.25	.22	.19	.18	.114	9
		10	.28	.23	.19	.27	.22	.19	.26	.21	.18	.24	.21	.18	.23	.20	.17	.16	.107	10
36  2-lamp prismatic wraparound—see note 7	V 1.2 	0	.82	.82	.82	.77	.77	.77	.69	.69	.69	.61	.61	.61	.53	.53	.53	.50		
		1	.71	.67	.65	.67	.64	.61	.59	.57	.55	.52	.51	.49	.46	.45	.44	.40	.234	1
		2	.62	.57	.53	.59	.54	.51	.52	.49	.46	.46	.44	.41	.41	.39	.37	.34	.194	2
		3	.55	.49	.45	.52	.47	.43	.46	.42	.39	.41	.38	.36	.37	.34	.32	.30	.168	3
		4	.49	.43	.39	.47	.41	.37	.42	.37	.34	.37	.34	.31	.33	.30	.28	.26	.150	4
		5	.44	.38	.34	.42	.36	.32	.38	.33	.30	.34	.30	.27	.30	.27	.25	.23	.135	5
		6	.40	.34	.29	.38	.32	.28	.34	.30	.26	.31	.27	.24	.28	.25	.22	.20	.123	6
		7	.36	.30	.26	.35	.29	.25	.31	.27	.23	.28	.25	.22	.25	.22	.20	.18	.112	7
		8	.33	.27	.23	.32	.26	.23	.29	.24	.21	.26	.22	.20	.23	.20	.18	.16	.104	8
		9	.30	.25	.21	.29	.24	.20	.26	.22	.19	.24	.20	.18	.22	.19	.16	.15	.097	9
		10	.28	.23	.19	.27	.22	.18	.25	.20	.17	.22	.19	.16	.20	.17	.15	.14	.090	10

STATEMENT OF IAN LEWIN

EXHIBIT F

Fig. 9-34. *Continued*

Typical Luminaire	Typical Intensity Distribution and Per Cent Lamp Lumens	Maint. Cat.	SC	RCR	ρcc → 80			70			50			30			10			0	WDRC	ρcc →
				↓	ρw → 50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0		ρw → RCR ↓
					Coefficients of Utilization for 20 Per Cent Effective Floor Cavity Reflectance (ρ_{FC} = 20)																	
43 		V	1.4/1.3	0	.78	.78	.78	.76	.76	.76	.73	.73	.73	.70	.70	.70	.67	.67	.67	.66		
				1	.71	.68	.66	.69	.67	.65	.66	.65	.63	.64	.63	.61	.62	.61	.60	.58	.181	1
				2	.63	.60	.57	.62	.59	.56	.60	.57	.55	.58	.56	.54	.56	.54	.52	.51	.180	2
				3	.57	.52	.49	.56	.52	.48	.54	.51	.48	.52	.49	.47	.51	.48	.46	.45	.173	3
				4	.51	.46	.43	.50	.46	.42	.49	.45	.42	.47	.44	.41	.46	.43	.41	.39	.164	4
				5	.46	.41	.37	.46	.41	.37	.44	.40	.37	.43	.39	.36	.42	.39	.36	.35	.154	5
				6	.42	.37	.33	.41	.37	.33	.40	.36	.33	.39	.35	.32	.38	.35	.32	.31	.145	6
				7	.38	.33	.29	.38	.33	.29	.37	.32	.29	.36	.32	.29	.35	.32	.29	.28	.136	7
				8	.35	.30	.26	.35	.30	.26	.34	.29	.26	.33	.29	.26	.32	.29	.26	.25	.127	8
				9	.32	.27	.24	.32	.27	.24	.31	.27	.24	.31	.27	.24	.30	.26	.24	.22	.120	9
4-lamp, 610 mm (2′) wide unit with sharp cutoff (high angle—low luminance) flat prismatic lens—see note 7				10	.30	.25	.22	.30	.25	.22	.29	.25	.22	.28	.24	.22	.28	.24	.21	.20	.113	10
44 		IV	N.A.	0	.71	.71	.71	.70	.70	.70	.66	.66	.66	.64	.64	.64	.61	.61	.61	.60		
				1	.64	.62	.60	.63	.61	.60	.60	.59	.58	.58	.57	.56	.56	.55	.54	.53	.167	1
				2	.57	.54	.51	.56	.53	.51	.54	.52	.50	.52	.50	.48	.51	.49	.47	.46	.170	2
				3	.51	.47	.44	.50	.46	.43	.49	.45	.43	.47	.44	.42	.46	.43	.41	.40	.165	3
				4	.46	.41	.38	.45	.41	.37	.44	.40	.37	.42	.39	.36	.41	.38	.36	.35	.157	4
				5	.41	.36	.33	.40	.36	.32	.39	.35	.32	.38	.35	.32	.37	.34	.31	.30	.148	5
				6	.37	.32	.28	.36	.32	.28	.35	.31	.28	.34	.31	.28	.34	.30	.28	.27	.139	6
				7	.33	.29	.25	.33	.28	.25	.32	.28	.25	.31	.27	.25	.30	.27	.24	.23	.130	7
				8	.30	.26	.22	.30	.25	.22	.29	.25	.22	.28	.25	.22	.28	.24	.22	.21	.122	8
Bilateral batwing distribution—louvered fluorescent unit				9	.28	.23	.20	.27	.23	.20	.27	.23	.20	.26	.22	.20	.25	.22	.19	.18	.115	9
				10	.25	.21	.18	.25	.21	.18	.25	.20	.18	.24	.20	.18	.23	.20	.18	.17	.108	10
45 		V	N.A.	0	.57	.57	.57	.56	.56	.56	.53	.53	.53	.51	.51	.51	.49	.49	.49	.48		
				1	.50	.48	.46	.49	.47	.45	.47	.45	.44	.45	.43	.42	.43	.42	.41	.40	.204	1
				2	.43	.40	.37	.42	.39	.36	.40	.38	.35	.39	.37	.35	.37	.36	.34	.33	.192	2
				3	.37	.33	.30	.37	.33	.30	.35	.32	.29	.34	.31	.29	.33	.30	.28	.27	.175	3
				4	.33	.28	.25	.32	.28	.25	.31	.27	.24	.30	.27	.24	.29	.26	.24	.23	.159	4
				5	.29	.24	.21	.28	.24	.21	.27	.24	.21	.26	.23	.20	.25	.23	.20	.19	.145	5
				6	.26	.21	.18	.25	.21	.18	.24	.21	.18	.24	.20	.18	.23	.20	.17	.16	.132	6
				7	.23	.19	.16	.23	.18	.15	.22	.18	.15	.21	.18	.15	.21	.17	.15	.14	.122	7
				8	.21	.17	.14	.21	.16	.14	.20	.16	.13	.19	.16	.13	.19	.16	.13	.12	.112	8
Bilateral batwing distribution—4-lamp, 610 mm (2′) wide fluorescent unit with flat prismatic lens and overlay—see note 7				9	.19	.15	.12	.19	.15	.12	.18	.14	.12	.18	.14	.12	.17	.14	.12	.11	.104	9
				10	.17	.13	.11	.17	.13	.11	.17	.13	.11	.16	.13	.11	.16	.13	.10	.10	.096	10
46 		V	N.A.	0	.87	.87	.87	.84	.84	.84	.77	.77	.77	.72	.72	.72	.66	.66	.66	.64		
				1	.75	.72	.69	.72	.69	.66	.67	.64	.62	.62	.60	.58	.57	.56	.54	.52	.296	1
				2	.65	.60	.56	.63	.58	.54	.58	.54	.51	.54	.51	.48	.50	.47	.45	.43	.261	2
				3	.57	.51	.46	.55	.49	.45	.51	.46	.42	.47	.43	.40	.44	.41	.38	.36	.232	3
				4	.50	.44	.39	.48	.42	.38	.45	.40	.36	.42	.38	.34	.39	.35	.32	.30	.209	4
				5	.45	.38	.33	.43	.37	.32	.40	.35	.31	.37	.33	.29	.35	.31	.28	.26	.189	5
				6	.40	.33	.28	.39	.32	.28	.36	.31	.26	.34	.29	.25	.31	.27	.24	.22	.172	6
				7	.36	.29	.25	.35	.29	.24	.32	.27	.23	.30	.26	.22	.28	.24	.21	.19	.158	7
				8	.33	.26	.22	.31	.25	.21	.29	.24	.20	.28	.23	.20	.26	.22	.19	.17	.146	8
Bilateral batwing distribution—one-lamp, surface mounted fluorescent with prismatic wraparound lens				9	.30	.23	.19	.29	.23	.19	.27	.22	.18	.25	.21	.17	.24	.20	.17	.15	.135	9
				10	.27	.21	.17	.26	.21	.17	.25	.20	.16	.23	.19	.16	.22	.18	.15	.13	.126	10
47 		V	1.7	0	.71	.71	.71	.69	.69	.69	.66	.66	.66	.63	.63	.63	.61	.61	.61	.60		
				1	.62	.59	.57	.60	.58	.56	.58	.56	.54	.55	.54	.52	.53	.52	.51	.50	.251	1
				2	.53	.49	.46	.52	.48	.45	.50	.47	.44	.48	.45	.43	.46	.44	.42	.41	.237	2
				3	.46	.41	.37	.45	.41	.37	.44	.40	.36	.42	.39	.36	.40	.38	.35	.34	.216	3
				4	.41	.35	.31	.40	.35	.31	.38	.34	.30	.37	.33	.30	.36	.32	.30	.28	.196	4
				5	.36	.30	.26	.35	.30	.26	.34	.29	.26	.33	.29	.26	.32	.28	.25	.24	.178	5
				6	.32	.27	.23	.32	.26	.23	.31	.26	.22	.29	.25	.22	.29	.25	.22	.21	.162	6
				7	.29	.24	.20	.28	.23	.20	.28	.23	.19	.27	.22	.19	.26	.22	.19	.18	.149	7
				8	.26	.21	.17	.26	.21	.17	.25	.20	.17	.24	.20	.17	.24	.20	.17	.16	.137	8
Radial batwing distribution—4-lamp, 610 mm (2′) wide fluorescent unit with flat prismatic lens—see note 7				9	.24	.19	.15	.24	.19	.15	.23	.18	.15	.22	.18	.15	.22	.18	.15	.14	.127	9
				10	.22	.17	.14	.22	.17	.14	.21	.17	.14	.20	.16	.14	.20	.16	.14	.12	.118	10
48 		I	1.6/1.2	0	1.01	1.01	1.01	.96	.96	.96	.87	.87	.87	.79	.79	.79	.72	.72	.72	.68		
				1	.84	.79	.75	.80	.76	.72	.72	.69	.66	.65	.63	.60	.59	.57	.55	.52	.414	1
				2	.72	.65	.59	.68	.62	.57	.62	.57	.52	.56	.52	.48	.50	.47	.44	.41	.343	2
				3	.62	.54	.48	.59	.52	.46	.53	.47	.42	.48	.43	.39	.43	.39	.36	.33	.293	3
				4	.54	.46	.39	.52	.44	.38	.47	.40	.35	.42	.37	.33	.38	.34	.30	.27	.255	4
				5	.48	.40	.33	.46	.38	.32	.41	.35	.30	.38	.32	.28	.34	.29	.26	.23	.225	5
				6	.43	.35	.29	.41	.33	.28	.37	.31	.26	.34	.28	.24	.30	.26	.22	.20	.202	6
				7	.38	.30	.25	.37	.29	.24	.34	.27	.22	.31	.25	.21	.28	.23	.19	.17	.182	7
				8	.35	.27	.22	.33	.26	.21	.31	.24	.20	.28	.22	.18	.25	.21	.17	.15	.166	8
2-lamp fluorescent strip unit				9	.32	.24	.19	.30	.24	.19	.28	.22	.18	.26	.20	.16	.23	.19	.15	.13	.152	9
				10	.29	.22	.17	.28	.21	.17	.26	.20	.16	.24	.18	.15	.22	.17	.14	.12	.140	10

STATEMENT OF IAN LEWIN

EXHIBIT G

Fig. 9-34. *Continued*

Typical Luminaire	Typical Intensity Distribution and Per Cent Lamp Lumens		RCR	Coefficients of Utilization for 20 Per Cent Effective Floor Cavity Reflectance (ρ_{FC} = 20)																WDRC	RCR
			ρ_{CC} →	80			70			50			30			10			0		
			ρ_W →	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0		
	Maint. Cat.	SC	↓																		↓
37	V	1.3	0	.52	.52	.52	.50	.50	.50	.46	.46	.46	.43	.43	.43	.39	.39	.39	.38		
			1	.44	.42	.40	.42	.40	.39	.39	.37	.36	.36	.35	.33	.33	.32	.31	.30	.201	1
			2	.38	.35	.32	.37	.33	.31	.34	.31	.29	.31	.29	.27	.28	.27	.25	.24	.171	2
			3	.33	.29	.26	.32	.28	.25	.29	.26	.24	.27	.25	.22	.25	.23	.21	.20	.149	3
			4	.29	.25	.22	.28	.24	.21	.26	.23	.20	.24	.21	.19	.22	.20	.18	.17	.132	4
			5	.26	.22	.19	.25	.21	.18	.23	.20	.17	.21	.18	.16	.20	.17	.15	.14	.117	5
			6	.23	.19	.16	.22	.18	.16	.21	.17	.15	.19	.16	.14	.18	.15	.13	.12	.106	6
			7	.21	.17	.14	.20	.16	.14	.19	.15	.13	.17	.15	.12	.16	.14	.12	.11	.096	7
			8	.19	.15	.12	.18	.15	.12	.17	.14	.12	.16	.13	.11	.15	.12	.11	.10	.088	8
			9	.17	.14	.11	.17	.13	.11	.16	.13	.10	.15	.12	.10	.14	.11	.09	.09	.081	9
2-lamp diffuse wraparound—see note 7			10	.16	.12	.10	.15	.12	.10	.14	.11	.09	.14	.11	.09	.13	.10	.09	.08	.075	10
38	IV	1.0	0	.60	.60	.60	.58	.58	.58	.56	.56	.56	.53	.53	.53	.51	.51	.51	.50		
			1	.53	.51	.49	.52	.50	.49	.50	.48	.47	.48	.47	.46	.46	.45	.44	.43	.168	1
			2	.47	.44	.42	.46	.43	.41	.44	.42	.40	.43	.41	.39	.41	.40	.38	.37	.159	2
			3	.42	.38	.36	.41	.38	.35	.40	.37	.35	.39	.36	.34	.37	.35	.34	.32	.146	3
			4	.38	.34	.31	.37	.34	.31	.36	.33	.30	.35	.32	.30	.34	.32	.30	.29	.135	4
			5	.34	.30	.27	.34	.30	.27	.33	.29	.27	.32	.29	.27	.31	.28	.26	.25	.124	5
			6	.31	.27	.24	.31	.27	.24	.30	.27	.24	.29	.26	.24	.28	.26	.24	.23	.114	6
			7	.29	.25	.22	.28	.24	.22	.28	.24	.22	.27	.24	.21	.26	.23	.21	.20	.106	7
			8	.26	.22	.20	.26	.22	.20	.25	.22	.20	.25	.22	.20	.24	.21	.19	.19	.099	8
4-lamp, 610 mm (2′) wide troffer with 45° plastic louver—see note 7			9	.24	.21	.18	.24	.21	.18	.24	.20	.18	.23	.20	.18	.23	.20	.18	.17	.092	9
			10	.23	.19	.17	.22	.19	.17	.22	.19	.16	.22	.19	.16	.21	.18	.16	.16	.086	10
39	IV	0.9	0	.55	.55	.55	.54	.54	.54	.51	.51	.51	.49	.49	.49	.47	.47	.47	.46		
			1	.49	.48	.46	.48	.47	.46	.46	.45	.44	.45	.44	.43	.43	.42	.42	.41	.137	1
			2	.44	.42	.40	.43	.41	.39	.42	.40	.38	.40	.39	.37	.39	.38	.37	.36	.131	2
			3	.40	.37	.34	.39	.36	.34	.38	.36	.33	.37	.35	.33	.36	.34	.32	.32	.122	3
			4	.36	.33	.30	.36	.33	.30	.35	.32	.30	.34	.31	.29	.33	.31	.29	.28	.113	4
			5	.33	.30	.27	.33	.29	.27	.32	.29	.27	.31	.28	.26	.30	.28	.26	.25	.104	5
			6	.30	.27	.24	.30	.27	.24	.29	.26	.24	.29	.26	.24	.28	.25	.24	.23	.097	6
			7	.28	.25	.22	.28	.24	.22	.27	.24	.22	.26	.24	.22	.26	.23	.22	.21	.090	7
			8	.26	.23	.20	.26	.22	.20	.25	.22	.20	.25	.22	.20	.24	.22	.20	.19	.085	8
4-lamp, 610 mm (2′) wide troffer with 45° white metal louver—see note 7			9	.24	.21	.19	.24	.21	.19	.23	.20	.18	.23	.20	.18	.23	.20	.18	.18	.079	9
			10	.23	.19	.17	.22	.19	.17	.22	.19	.17	.22	.19	.17	.21	.19	.17	.16	.075	10
40	V	1.2	0	.73	.73	.73	.71	.71	.71	.68	.68	.68	.65	.65	.65	.62	.62	.62	.60		
			1	.63	.60	.58	.62	.59	.57	.59	.57	.55	.56	.55	.53	.54	.53	.51	.50	.259	1
			2	.55	.51	.47	.54	.50	.46	.51	.48	.45	.49	.46	.44	.47	.45	.43	.42	.236	2
			3	.48	.43	.39	.47	.42	.39	.45	.41	.38	.43	.40	.37	.42	.39	.36	.35	.212	3
			4	.43	.37	.33	.42	.37	.33	.40	.36	.32	.39	.35	.32	.37	.34	.31	.30	.191	4
			5	.38	.33	.29	.37	.32	.28	.36	.31	.28	.35	.31	.28	.33	.30	.27	.26	.173	5
			6	.34	.29	.25	.34	.29	.25	.33	.28	.24	.31	.27	.24	.30	.27	.24	.23	.158	6
			7	.31	.26	.22	.31	.26	.22	.30	.25	.22	.29	.25	.21	.28	.24	.21	.20	.144	7
			8	.28	.23	.20	.28	.23	.20	.27	.23	.19	.26	.22	.19	.25	.22	.19	.18	.133	8
Fluorescent unit dropped diffuser, 4-lamp 610 mm (2′) wide—see note 7			9	.26	.21	.18	.26	.21	.18	.25	.21	.17	.24	.20	.17	.24	.20	.17	.16	.123	9
			10	.24	.19	.16	.24	.19	.16	.23	.19	.16	.22	.19	.16	.22	.18	.16	.15	.115	10
41	V	1.2	0	.69	.69	.69	.67	.67	.67	.64	.64	.64	.61	.61	.61	.59	.59	.59	.58		
			1	.60	.58	.55	.59	.57	.55	.56	.55	.53	.54	.53	.51	.52	.51	.50	.49	.227	1
			2	.52	.49	.45	.51	.48	.45	.49	.46	.44	.47	.45	.43	.46	.44	.42	.40	.214	2
			3	.46	.41	.38	.45	.41	.37	.43	.40	.37	.42	.39	.36	.40	.38	.35	.34	.196	3
			4	.41	.36	.32	.40	.35	.32	.39	.34	.31	.37	.34	.31	.36	.33	.30	.29	.178	4
			5	.36	.31	.28	.36	.31	.27	.35	.30	.27	.33	.30	.27	.32	.29	.26	.25	.162	5
			6	.33	.28	.24	.32	.27	.24	.31	.27	.24	.30	.26	.23	.29	.26	.23	.22	.148	6
			7	.30	.25	.21	.29	.25	.21	.28	.24	.21	.28	.24	.21	.27	.23	.21	.20	.136	7
			8	.27	.22	.19	.27	.22	.19	.26	.22	.19	.25	.21	.19	.25	.21	.19	.17	.126	8
Fluorescent unit with flat bottom diffuser, 4-lamp 610 mm (2′) wide—see note 7			9	.25	.20	.17	.25	.20	.17	.24	.20	.17	.23	.20	.17	.23	.19	.17	.16	.116	9
			10	.23	.18	.15	.23	.18	.15	.22	.18	.15	.22	.18	.15	.21	.18	.15	.14	.108	10
42	V	1.4/1.2	0	.75	.75	.75	.73	.73	.73	.70	.70	.70	.67	.67	.67	.64	.64	.64	.63		
			1	.67	.64	.62	.65	.63	.61	.63	.61	.59	.60	.59	.58	.58	.57	.56	.55	.208	1
			2	.59	.56	.52	.58	.55	.52	.56	.53	.51	.54	.52	.49	.52	.50	.48	.47	.199	2
			3	.53	.48	.45	.52	.48	.44	.50	.46	.43	.48	.45	.43	.47	.44	.42	.41	.186	3
			4	.47	.42	.38	.46	.42	.38	.45	.41	.38	.44	.40	.37	.42	.39	.37	.35	.172	4
			5	.43	.37	.34	.42	.37	.33	.41	.36	.33	.39	.36	.33	.38	.35	.32	.31	.160	5
			6	.39	.33	.30	.38	.33	.29	.37	.32	.29	.36	.32	.29	.35	.31	.29	.27	.148	6
			7	.35	.30	.26	.35	.30	.26	.34	.29	.26	.33	.29	.26	.32	.28	.26	.24	.138	7
			8	.32	.27	.24	.32	.27	.23	.31	.26	.23	.30	.26	.23	.29	.26	.23	.22	.128	8
Fluorescent unit with flat prismatic lens, 4-lamp 610 mm (2′) wide—see note 7			9	.30	.25	.21	.29	.24	.21	.28	.24	.21	.28	.24	.21	.27	.24	.21	.20	.120	9
			10	.27	.22	.19	.27	.22	.19	.26	.22	.19	.26	.22	.19	.25	.22	.19	.18	.113	10

STATEMENT OF IAN LEWIN

EXHIBIT H

constructed that the housing forms the reflecting surface. The assembly is enclosed by a cover glass.

germicidal effectiveness† See *bactericidal (germicidal) effectiveness.*

germicidal efficiency of radiant flux† See *bactericidal (germicidal) efficiency of radiant flux.*

germicidal exposure† See *bactericidal (germicidal) exposure.*

germicidal flux and flux density† See *bactericidal (germicidal) flux* and *bactericidal (germicidal) flux density.*

germicidal lamp a low-pressure mercury lamp in which the envelope has high transmittance for 254-nm radiation. See *bactericidal lamp.*

glare the sensation produced by luminances within the visual field that are sufficiently greater than the luminance to which the eyes are adapted, which causes annoyance, discomfort, or loss in visual performance and visibility. See *blinding glare, direct glare, disability glare,* and *discomfort glare.*

Note The magnitude of the sensation of glare depends on such factors as the size, position, and luminance of a source; the number of sources; and the luminance to which the eyes are adapted.

globe a transparent or diffusing enclosure intended to protect a lamp, to diffuse and redirect its light, or to change the color of the light.

glossometer an instrument for measuring gloss as a function of the directionally selective reflecting properties of a material in angles near to and including the direction giving specular reflection.

glow discharge an electric discharge characterized by a low, approximately constant current density at the cathode (on the order of 10 $\mu A/mm^2$) at low cathode temperature and a high voltage drop (typically 50 V or more). Secondary emission from the cathode is much greater than the thermionic emission.

Note A distinction is made between the normal cathode drop (potential difference due to space charge near the cathode) that occurs when the glow does not cover the cathode completely (with constant current density) and that is independent of the discharge current, and the abnormal cathode drop that occurs when the glow covers the cathode completely (with increased current density) and that depends on the discharge current.

glow factor a measure of the visible light response of a fluorescent material to black light. It is equal to π times the luminance in cd/m^2 produced on the material divided by the incident black-light flux density in mW/m^2. It can be measured in lm/mW.

glow lamp an electric-discharge lamp whose mode of operation is that of a glow discharge and in which light is generated in the space close to the electrodes.

goniophotometer a photometer for measuring the directional light distribution characteristics of sources, luminaires, media, and surfaces.

graybody a temperature radiator whose spectral emissivity is less than unity and the same at all wavelengths.

ground-area open floodlight (O) a unit providing a weatherproof enclosure for the lamp socket and housing. No cover glass is required.

ground-area open floodlight with reflector insert (OI) a weatherproof unit so constructed that the housing forms only part of the reflecting surface. An auxiliary reflector is used to modify the distribution of light. No cover glass is required.

ground light visible radiation from the sun and sky reflected by surfaces below the plane of the horizon.

group flashing light a flashing light in which the flashes are combined in groups, each including the same number of flashes, and in which the groups are repeated at regular intervals. The duration of each flash is clearly less than the duration of the dark periods between flashes, and the duration of the dark periods between flashes is clearly less than the duration of the dark periods between groups.

H

hard light light that causes an object to cast a sharply defined shadow.

hazard or obstruction beacon an aeronautical beacon used to designate a danger to air navigation.

hazardous location an area where ignitable vapors or dust can cause a fire or explosion created by energy emitted from lighting or other electrical equipment or by electrostatic generation.

headlamp a major lighting device mounted on a vehicle and used to provide illumination ahead of it. Also called a *headlight.* See *multiple-beam headlamp* and *sealed-beam headlamp.*

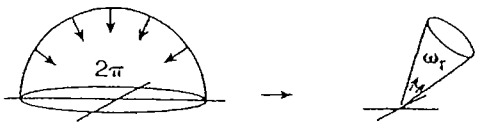
headlight† an alternative term for headlamp.

heat extraction thermal factor the fractional lumen loss or gain due to passage of room air being returned to the plenum through the lamp compartment of the luminaire.

heavy-duty floodlight (HD) a weatherproof unit having a substantially constructed metal housing into which is placed a separate and removable reflector. A weatherproof hinged door with cover glass encloses the assembly but provides an unobstructed light opening at least equal to the effective diameter of the reflector.

hemispherical-conical reflectance, $\rho(2\pi; \omega_r)$ the ratio of reflected flux collected over a conical solid angle to the incident flux from the entire hemisphere.

Note The direction and extent of the cone must be specified.



DEFENDANT'S MARKMAN STATEMENT

EXHIBIT 3

Webster's Third New International Dictionary

OF THE ENGLISH LANGUAGE

UNABRIDGED

A Merriam-Webster
REG. U.S. PAT. OFF.

Utilizing all the experience and resources of more than one hundred years of Merriam-Webster® dictionaries

EDITOR IN CHIEF
PHILIP BABCOCK GOVE, Ph.D.
AND
THE MERRIAM-WEBSTER
EDITORIAL STAFF

MERRIAM-WEBSTER INC., *Publishers*
SPRINGFIELD, MASSACHUSETTS, U.S.A.

A GENUINE MERRIAM-WEBSTER

The name *Webster* alone is no guarantee of excellence. It is used by a number of publishers and may serve mainly to mislead an unwary buyer.

A Merriam-Webster® is the registered trademark you should look for when you consider the purchase of dictionaries or other fine reference books. It carries the reputation of a company that has been publishing since 1831 and is your assurance of quality and authority.

Library of Congress Cataloging in Publication Data
Main entry under title:

Webster's third new international dictionary of the English language, unabridged.

Includes index.
1. English language—Dictionaries. I. Gove, Philip Babcock, 1902–1972. II. Merriam-Webster Inc.
PE1625.W36 1986 423 85-31018
ISBN 0-87779-201-1 (blue Sturdite)
ISBN 0-87779-206-2 (imperial buckram)

MADE IN THE UNITED STATES OF AMERICA

44AG/KP91

at FIRE] : MIZZONITE; *specif* : a variety of scap[illegible] the components marialite and meionite in a ratio of [illegible]:2
dir *abbr* 1 direction; directional 2 director
di-radical \(ˌ)dī+\ *n* -s [*di-* + *radical*] : BIRADICAL
dir-ca \ˈdərkə\ *n* [NL, fr. L *Dirce*, a fountain near Thebes in Boeotia, fr. Gk *Dirkē*] 1 *cap* : a genus of shrubs (family Thymelaeaceae) having tough fibrous bark and clusters of yellow flowers — see LEATHERWOOD 1a 2 -s : any plant of the genus *Dirca*
[1]dird \ˈdərd\ *n* -s [prob. short for *dirdum*] *Scot* : a powerful blow or stroke
[2]dird \ˈ"\ *vb*, *Scot* : BUMP, BOUNCE, JOLT
dir-dum \ˈdərdəm\ *n* -s [ME (northern dial.) *durdan*, fr. ScGael, grumbling, hum, dim. of *durd* hum, word, sound; akin to IrGael *dordan* hum, buzz, *dord* humming, buzzing] 1 *Scot* : UPROAR, FUSS 2 *Scot* a : REBUKE, SCOLDING b : BLAME, PUNISHMENT 3 *Scot* : a piece of bad luck : MISFORTUNE
dire \ˈdī(ə)r, -ī(ə)r\ *adj* -ER/-EST [L *dirus*; akin to Gk *dedienai* to fear, *deos* fear, *deinos* terrible, Av *duuiθā* threat, Skt *dveṣṭi* he hates] 1 a : exciting horror or terror esp. because of the great suffering or loss or devastating ruin actually caused or only threatened ⟨the ~ days of bombing raids⟩ (if South America were to seek her imports elsewhere, it would be a ~ blow to us —Gustave Weigel) ⟨the ~ fate which the Lord had seen fit to visit upon her sinful employers —W.H.Wright⟩ b : inducing mental suffering or depression by reason of concern with a dreaded eventuality or a grievous circumstance : AFFLICTIVE, PAINFUL ⟨palsied by the ~ news of the president's death⟩ c : oppressive to the feelings or spirit : DISMAL, CHEERLESS ⟨the heavy drag of winter is then at its most ~ —F.M.Ford⟩ ⟨despite its ~ point of view, the book jests and jostles with life —*Time*⟩ 2 : warning of disaster to come : OMINOUS, SINISTER ⟨in the fight against foot-and-mouth disease proposals to substitute vaccination for eradication evoked ~ forecasts⟩ 3 a : demanding immediate action to fend off disastrous consequences : EXIGENT, URGENT ⟨spokesmen talked about the ~ need for school buildings, which had been at least equally ~ during the previous two years —W.L.Miller⟩ ⟨this was due to ~ necessities elsewhere and not to direct intent or indifference —Herbert Feis⟩ b : close to the utmost limit of sufferance : most acute : EXTREME, DESPERATE ⟨scope is left for instantaneous action, but only in the *direst* emergency —A.P.Ryan⟩ ⟨while their means were always modest there was no trace of ~ poverty —J.T.Ellis⟩ ⟨left his family in ~ financial straits⟩
SYN see FEARFUL
[1]di-rect \də'rekt *also* dī'-, *sometimes* 'dī,r- — *compare* [2]DIRECT\ *vb* -ED/-ING/-S [ME *directen*, fr. L *directus*, past part. of *dirigere* to set straight, direct, guide — more at DRESS] *vt* 1 a *obs* : to dedicate to a person b *obs* : to write to a person c : to mark or label the outer surface of (a message or package to be delivered) with the name and residence or place of business of the intended recipient : SUPERSCRIBE d : to supply with a heading, statement, or other indication of a specific addressee or desired recipient ⟨the auditors' certificate ~*ed* to the stockholders⟩ e : to impart orally ⟨the speaker ~*ed* a side remark to the gallery⟩ f : to adapt and arrange in expression so as to have particular applicability or appeal : ANGLE — used with *to* or *at* ⟨a lawyer who ~*s* his appeals to intelligence and character⟩ 2 : to cause to turn, move, or point undeviatingly or to follow a straight course with a particular destination or object in view: a : to dispatch, aim, or guide (a missile) along a fixed path ⟨X rays are ~*ed* through a portion of the body⟩ ⟨wavelengths ~*ed* to southeast Asia⟩ ⟨sensitivity to humor ~*ed* toward himself⟩ ⟨to Peru was ~*ed* one of the main currents of Spanish colonial conquest —P.E.James⟩ ⟨that Locke's influence upon his successors was primarily to ~ them to empiricism —J.W.Yolton⟩; *also* : ASSIGN, ALLOT ⟨many industries ~ part of their earnings to academic scholarship funds⟩ b : to devote with concentration — used usu. with *to* or *toward* ⟨has he found that he must have someone else toward whom he can ~ his mind and in whom he can expand himself —H.A.Overstreet⟩ ⟨~*ing* their whole attention toward the international conflict⟩ c : to aim fixedly : concern or involve oneself primarily or totally with — used with *to* or *toward* ⟨ecclesiastical policy was ~*ed* primarily toward the liberation of the church from the fetters of secular interest and state expediency —H.D.Hazeltine⟩ ⟨applied research may be defined as research ~*ed* to the end of reducing the degree of empiricism in a practical art —J.B.Conant⟩ d : to point, extend, or project esp. upward or downward ⟨in these mammoths the tusks are vertically ~*ed* at their bases —A.S.Romer⟩ e : to engage in or launch hostilely : FOCUS — used with *against* or *at* ⟨our policy is not ~*ed* against any country or doctrine but against hunger, poverty, desperation, and chaos —G.C. Marshall⟩ ⟨if atomic or biological warfare should be ~*ed* against us⟩; *also* : to institute for possible launching or application ⟨binding agreements of a much more specific character ~*ed* at a potential aggressor —Vera M. Dean⟩ 3 : to show or point out the way for ⟨a guide ~*s* tourists to the marine museum⟩ ⟨the map ~*s* us to the left⟩ 4 : to regulate the activities or course of: a : to guide and supervise ~*ed* the floor strategy in the House of Representatives⟩ ⟨the archaeologist ~*ing* the excavations⟩; *specif* : to carry out the organizing, energizing, and supervising of esp. in an authoritative capacity ⟨~*ed* the building and arming of an underground network⟩ ⟨not only public propaganda, but also cultural infiltration, is ~*ed* from the same source —A.T.Bouscaren⟩ b : ADMINISTER, CONDUCT ⟨ably ~*ed* music and language departments⟩ ⟨while in office he ~*ed* vigorous prosecutions of racketeers⟩ c : to dominate and determine the course of ⟨will not find it preposterous that the past should be altered by the present as much as the present is ~*ed* by the past —T.S.Eliot⟩ d : to assist by giving advice, instruction, and supervision ⟨the major professor ~*s* graduate students' thesis research⟩; *specif* : to lend a refining, cultivating, or inspiring influence to ⟨~ American taste and mold the genius of the young republic —Van Wyck Brooks⟩ e : to train and lead performances of (a musical or dramatic aggregation); *also* : to lead a group in presenting (a ballet, opera, concert, play, or motion picture) 5 a : to request or enjoin esp. with authority ⟨the judge ~*ed* the clerk to pass him the paper⟩ ⟨the resolution ~*ed* the commission to prepare proposals⟩ ⟨I ~ my executors to present my library intact to my alma mater⟩; *also* : to issue an order to ⟨Lee ~*ed* Jackson to make a wide march to the southwest —T.R.Hay⟩ b : to prescribe esp. by formal or mandatory instruction or legal enactment ⟨a court order ~*ing* that the person be brought to a court hearing⟩ ⟨postal inspectors ~*ed* destruction of the obscene matter⟩ ~ *vi* 1 : to point out, prescribe, or determine a course or procedure ⟨however chance shall ~⟩ ⟨the ~*ing* agencies of society — the family, the city, the church, the school, the workshop, and above all the state —J.M.Cameron⟩ ⟨the old theological notion that there is in the universe besides ourselves some ~*ing* power that means well by us —J.W.Beach⟩ 2 : to direct an orchestra or chorus or a dramatic group or performance ⟨equally clever at composing and ~*ing*⟩
SYN ADDRESS, DEVOTE, APPLY: these four verbs have in common a reflexive use signifying to turn or bend one's attention, energies, or efforts to something. DIRECT and ADDRESS are not significantly different; one can *direct* or *address* oneself to a task, to one's work, or to the study of something; one can *direct* or *address* one's attention, one's remarks, one's writings to something or someone. DIRECT may possibly stress more an aim or intent, ADDRESS more an appeal to or claim upon attention or interest ⟨asked myself to what purpose I should *direct* my energies —M.R.Cohen⟩ ⟨to *direct* my endeavors . . . toward the object of my search —Mary W. Shelley⟩ ⟨speakers *addressed* themselves to a common question —H.W.Sams⟩ ⟨a story *addressed* not only to one's sense of excitement and the exotic but also to his sense of honor and humanity —Charles Lee⟩ DEVOTE often adds the implication of persistence or of personal dedication ⟨at Cornell he *devoted* himself primarily to his studies and to athletics —*Current Biog.*⟩ ⟨*devoted* himself chiefly to the affairs of this school for the next eight or ten years of his life —S.P.Chase & R.E.Ham⟩ APPLY stresses often an intentional turning of the attention or energies, often a concentration or concentrated application; one APPLIES oneself to a task when, after consideration, he determines upon doing the task, or when he directs his whole attention to it, esp. for some time ⟨he cannot *apply* himself to study —Charles Clairmont⟩ ⟨after having received a careful education . . . he *applied* his attention to practical military subjects —*Encyc. Americana*⟩ SYN see in addition COMMAND, CONDUCT
[2]di-rect \də'rekt *also* (ˌ)dī'r-, *rapid* 'dre-; *after a monosyllabic prefix* -dī- *occurs less often than in other environments, pronunciations like* dī,rekt(ə)'nīnd(ə)d,rekt (*"direct and indirect"*) *being frequent*\ *adj sometimes* -ER/-EST [ME, fr. L *directus* straight, direct, fr. past part. of *dirigere*] 1 a : proceeding from one point to another in time or space without deviation or interruption : not crooked, oblique, reflected, refracted, or circuitous ⟨~ blows of the gavel⟩ ⟨disintegrated by the ~ heat⟩ ⟨exposed to the ~ force of the hurricane⟩ b : leading by the short or shortest way to a point or end ⟨a ~ route⟩ ⟨~ means⟩ ⟨~ rays⟩ ⟨~ and speedy passenger service to the coast⟩ c *obs* : moving or extending at a right angle to a surface (a ship needs a ~ wind to enter⟩ d : transmitted back and forth without an intermediary ⟨engaged in a ~ exchange of recriminations⟩ ⟨no ~ communication with the flooded area⟩ e : assigned in the postal service for separate delivery to a particular addressee rather than routed according to street address ⟨a letter deposited in a ~ pouch⟩ f : capable of being allocated to a particular portion or process of an undertaking and so treated in cost accounts; *specif* : chargeable to a particular job — compare DIRECT COST, DIRECT LABOR 2 a : operating or guided without digression or obstruction ⟨while he gives his more ~ attention to something nearer at hand —Nathaniel Hawthorne⟩ ⟨her letters . . . are a ~ reflection of her personality —R.A.Hall b. 1911⟩ ⟨~ expansion of consumption is the utmost urgency —*New Republic*⟩ b : stemming immediately from a source ⟨having no ~ authority over factory employment policies⟩ c : being or passing in a straight line of descent from parent to offspring : LINEAL ⟨only a collateral relative, not his ~ ancestor⟩ ⟨the examiner should not overvalue the influence of ~ heredity —H.G.Armstrong⟩ d : clear-cut and distinctive : having no compromising or impairing element : GENUINE, OUT-AND-OUT ⟨an undertaking having a ~ social purpose⟩ ⟨the soldier's pleasures are simple and ~ —Fred Majdalany⟩ ⟨hoping to avoid ~ involvement in the war⟩ e : blunt and unqualified : delivered point-blank : CATEGORICAL ⟨his petition for a salary increase was met with a ~ rebuff⟩ ⟨get back to your post. That's a ~ order —Irwin Shaw⟩ ⟨evidence from original documents of the dark ages often give the lie ~ to sentimental novelists⟩ f *cryptanalysis, of alphabetic sequences* : arranged or employed in traditional order : not reversed 3 a : characterized by or giving evidence of a close esp. logical, causal, or consequential relationship ⟨there is a ~ personal tie which assures the beginning of real understanding between individuals —D.J.Shank⟩ ⟨most scientific discoveries now have a ~ bearing on security⟩ ⟨for 20 years in ~ association with the library⟩ ⟨a hundred different complications in which we shall have a ~ interest —F.D. Roosevelt⟩ b : INEVITABLE, UNEQUIVOCAL ⟨one ~ result of improving the living conditions was a rise in the birthrate⟩ c : serving to get to the point : EFFECTIVE ⟨raising funds would be a ~*er* way of helping the cause⟩ d : communicating explicitly often with brusqueness : going straight to the point ⟨before any inquiry so ~ as to demand a positive answer was addressed to her —Jane Austen⟩ ⟨keeps the play ~, uncluttered, and so brisk that the long and familiar story does not make martyrs of its audience —Henry Hewes⟩ ⟨her choreography is ~, nowhere obscured by extraneous devices⟩ e : frank, natural, and positive : STRAIGHTFORWARD ⟨a charming, lively person who had a ~ mind, said what he thought and believed others did the same —*Times Lit. Supp.*⟩ ⟨that one's relations with others should be ~ and not diplomatic —A.C.Benson⟩ ⟨it often told you a great deal that was both too ~ and too elusive for words —Willa Cather⟩ f *of the object of a verb* : being the one that is the primary goal of an action ⟨*him* in "I saw him" and *me* in "he hit me" are ~ objects⟩ or that results from an action ⟨*a house* in "we built a house" is the ~ object⟩ 4 : marked by absence of an intervening agency, instrumentality, or influence : IMMEDIATE: a : made, carried on, or effected without any intruding factor or intervening step ⟨~ loans⟩ ⟨relying less and less on ~ observation of nature —Eric Newton⟩ ⟨some ~ borrowing of Anglo-Norman into English⟩ ⟨until the breaking off of ~ negotiations⟩ b : effected by the votes of the people or the electorate and not by representatives ⟨elected for 7 years by ~ suffrage —*Statesman's Yr. Bk.*⟩ ⟨institutions of ~ democracy — popular initiative, the referendum, and the recall —C.A.M.Ewing⟩ ⟨the ~ election of senators —E.P.Herring⟩ c : unhampered by divergent, intervening, or separative forces ⟨he had more ~ access to the governor than the legislators⟩ ⟨prefer the more ~ American approach to human problems —David Daiches⟩ d : effected by one object or substance in contact with another with no insulating or obstructing element between ⟨~ contact with another metal must be avoided⟩ ⟨there is no ~ connection between the apartments⟩ e : consisting of or reproducing the exact words of a real or supposed original speaker ⟨the words in quotation marks in the sentence *He said, "I can come"* are ~ quotation⟩ ⟨~ discourse⟩ f (1) : being without intermediate logical steps ⟨~ proofs⟩ (2) : independent of intermediate representations, percepts, images, or sense data ⟨~ knowledge of things⟩ g : not requiring an intermediate host for completion : MONOXENOUS — used of the life cycle or development of a parasitic organism h : capable of dyeing without the aid of a mordant : SUBSTANTIVE — see DIRECT DYE 5 a : experienced personally without associative effort of anyone else ⟨his account of the battle contains much ~ evidence⟩ ⟨whereas to conceal ~ pain was a virtue, to conceal vicarious pain was a sin —Ian Struther⟩; *specif* : FIRSTHAND ⟨from ~ experience with youngsters at camp⟩ b : active, personal, and responsible ⟨taking ~ charge of the distribution of relief funds⟩ ⟨the ordinary worker has a ~ part in the production process⟩; *specif* : not deputed or to be deputed ⟨few were willing to assume ~ responsibility⟩ 6 a *of a celestial body* : moving in the general planetary direction from west to east : not retrograde b *of a binary star* : following the direction of increasing position angle : COUNTERCLOCKWISE 7 *of a sundial* : having a vertical face and facing squarely toward one of the cardinal points of the compass
[3]di-rect \də'rekt *also* dī'-, *rapid* 'dre-\ *adv* [ME, fr. *direct*, adj.] : in a direct way: a : from point to point without deviation : by the short or shortest way ⟨by helicopter it is now possible to go ~ from port to airport in forty minutes —Ivor Jones⟩ ⟨despatching individual books ~ to individual teachers —James Britton⟩ b : from the source or the original without interruption or diversion ⟨broadcast ~ from ringside⟩ ⟨the writer must take his material ~ from life —Douglas Stewart⟩ c : mechanically joined or in mesh : mechanically or electrically in contact (*direct*-controlled by the helmsman) d (1) : without any intervening agency or step : without any intruding or diverting factor ⟨some enter a career ~ from college⟩ ⟨refusal to negotiate ~ with the puppet regime⟩; *specif* : without use of a broker or other middleman ⟨butter that is sold ~ without going through the exchanges —Geoffrey Shepherd⟩ (2) : EXPLICITLY, UNEQUIVOCALLY ⟨the right information ~ from his office⟩ ⟨in reporting news the television camera brings the event and the personalities ~ to the public —*Collier's Yr. Bk.*⟩ (3) : VERBATIM ⟨translated ~ from the Russian text⟩
[4]direct \ˈ"\ *n* -s [*direct*] 1 : a character sometimes put at the end of a musical staff or page of music on a line or space corresponding to the position of the first note of the next staff as a warning to the performer — called also *custos* 2 : a direct package of postal matter
di-rect-able \də'rektəbəl *also* dī'-, *rapid* 'dre-\ *adj* : capable of being directed
direct-acting \-'-,--\ *adj* : involving direct action without the intervention of other working parts ⟨*direct-acting* engine⟩ ⟨*direct-acting* pump⟩
direct action *n* : action that seeks to achieve an end directly and by the most immediately effective means as opposed to the use of diplomatic exchange or negotiation; *specif* : action by organized labor to obtain ends by means of boycott, sabotage, or striking — contrasted with *political action*
direct bearing *n* : direct vertical support for any structural element in a construction
direct black *n* : any of various direct dyes that dye cotton black — see DYE table I
direct cell division *n* : AMITOSIS
direct cerebellar tract *n* : a tract of fibers in the posterior part of the spinal cord that is external to the crossed pyramidal tract, that arises from the cells of the nucleus dorsalis, and that passes through the restiform body of the medulla to the cerebellum
direct-connected \-'-,--\ *adj, of machines* : being on a common shaft : DIRECT-COUPLED
direct contempt *n* : a contempt occurring in the presence of a court in session or so near as to interfere with the administration of justice or in the presence of a judge acting in a judicial capacity; *also* : a contempt directly obstructing a legislative body in the actual exercise of its lawful legislative powers — compare CONSTRUCTIVE CONTEMPT
direct control *n* : a control that is directly imposed upon the manufacturing, pricing, and distribution of specific goods in contrast with an indirect or general control (as a credit and fiscal policy) that affects the economy in its entirety and specific goods only indirectly
direct cost *also* **direct charge** *n* : a cost that may be computed and identified directly with a product, function, or activity and that usu. involves expenditures for raw materials and direct labor and sometimes specific and identifiable items of overhead — contrasted with *indirect cost*
direct-coupled \-'-,--\ *adj* 1 *of belting or gearing* : coupled without intermediate connections 2 *of an electric circuit* : having conductive rather than inductive or capacitive coupling
direct current *n* : an electric current flowing in one direction only and substantially constant in value — abbr. *D.C.*; compare ALTERNATING CURRENT
direct deep black EW *n, usu cap both Ds&B* : a trisazo dye derived from benzidine and used esp. for dyeing cotton and leather and as a biological stain — called also *chlorazol black E, direct black EW*; see DYE table I (*under Direct Black 38*)
direct democracy *n* : DEMOCRACY 1b(1)
direct development *n* : development without a metamorphosis
direct distance dialing *n* : the dialing of a telephone number outside the local calling area by using initial code numbers to make a direct connection — abbr. *DDD*
direct drive *n* : a drive whose driving and driven parts are direct-connected
direct-driven \-'-,--\ *adj* : driven by another machine to which it is direct-connected
direct dye *n* : a water-soluble dye usu. of the azo class that is used in alkaline or neutral solution esp. for dyeing cellulosic material (as cotton or paper) directly — see DYE table I
directed *adj* [fr. past part. of *[1]direct*] 1 : having a positive or negative sense — used of a line segment or vector 2 : subject to regulation by a guiding and supervising agency ⟨a ~ economy that would permit an increased volume of capital investments on the part of the state —C.A.L.Rich⟩ ⟨a ~ study program for gifted children⟩
di-rect-ed-ly *adv* : under guidance and supervision
di-rect-ed-ness *n* -ES : subjection to a guiding or motivating influence ⟨the interplay within the individual of these two ~*es* —Adam Curle⟩
directed number *n* : a number preceded by a plus or minus sign
directed verdict *n* : a verdict that the jury is instructed by the court to find when the facts proved do not admit in the court's opinion of any reasonable doubt
di-rect-ee \də,rek'tē, dī,r-, ˌdī,rek'-\ *n* -s [*[1]direct* + *-ee*] : one who receives direction
directer *comparative of* DIRECT
directest *superlative of* DIRECT
direct evidence *n* : evidence that if true immediately establishes the fact to be proved by it
direct examination *n* : the first examination of a witness in the orderly course by the party calling him and upon the merits
direct exchange *n* : FIXED EXCHANGE
direct finder *n* : DIRECT VIEWFINDER
direct fire *n* [*direct* + *fire*, v.] : gunfire by direct aiming on a visible target
direct-fire \-'-,--\ *vt* : to fire without provision for preheating the air or gas ⟨some furnaces are *direct-fired*⟩
direct-geared \ˈ"\ *adj* : connected for power transmission by a gear on the power shaft of one machine meshing with a gear on the driving or following shaft of another machine
direct grant school *n, in England & Wales* : a private secondary school that receives a direct grant from the ministry of education and in return binds itself to obey certain conditions with reference to admission of pupils
directing *pres part of* DIRECT
directing piece *n* : BASE PIECE
direct initiative *n* : the legislative initiative where a proposed measure is submitted directly to the voters — distinguished from *indirect initiative*; compare INITIATIVE 3b
direct investment *n* : investment of capital in physical assets or in ownership of a whole enterprise — contrasted with *portfolio investment*
[1]di-rec-tion \də'rekshən *also* dī'-, *rapid* 'drec-\ *n* -s [MF & L; MF, fr. L *direction-, directio*, fr. *directus* (past part. of *dirigere* to direct, guide) + *-ion-, -io* -ion — more at DRESS] 1 a : guidance or supervision of action, conduct, or operation ⟨the whole system of life had its culmination in the church; and parson and squire presided over its ~ —C.E.Raven⟩ ⟨under whose ~ this paper was written⟩ ⟨the doctrine that government should move forward toward ~ of the economy⟩; *specif* : chief executive function ⟨he was put in charge and given overall ~ of the program⟩ b : the art and technique of directing a stage play, a motion picture, or a television program consisting of the selection of the effects to be produced, the means to produce these effects, and the management and training of the cast c : the art and technique of directing the performance of an orchestra, opera, or concert or of a chorus or other musical group ⟨the musicianly ~ . . . helped illumine the score —Miles Kastendieck⟩ d : a word or phrase usu. in Italian or a sign indicating the appropriate tempo, mood, or intensity of a passage or movement in a musical score 2 *archaic* : the address placed on the outside of a letter or package to be delivered : SUPERSCRIPTION ⟨pray send me Grandmamma's ~. I must write to her —W.M.Thackeray⟩ 3 a : something that is imposed as authoritative instruction or bidding ⟨the senate had been voting according to ~ for so long that they seemed to have lost the power of independent decision —Robert Graves⟩ ⟨he gave orders all round and men quickly obeyed— relieved at ~ —Harris Downey⟩ b : an explicit instruction : ORDER, COMMAND ⟨a report prepared at the ~ of the president⟩ — often used in pl. ⟨the author's stage ~*s* to actors and cameramen⟩ ⟨~*s* appear on the package⟩ c : the charge or instruction given on a point of law by a judge to a jury 4 *obs* : administrative capacity 5 a : the property of space by which given two positions others may be generated or determined in the same dimension and relation, the aspect of progression being usu. implicit b : the line or course on which something is moving or is aimed to move or along which something is pointing or facing ⟨the ~ of a current is that toward which the water moves, which is the reverse of the way winds are named —G.W.Mixter⟩ ⟨follow the ~ of the arrow⟩ c : a line or course extending away from a given point through space and often designated by the point of the compass toward which it extends ⟨from the tower sweeping views in all ~*s*⟩ ⟨below the falls the river meanders in a southeasterly ~⟩ d : the shortest path toward the vicinity or source — used in the expression *in the direction of* ⟨throwing grenades in the ~ of the voices⟩ e : a position on a line extending through space toward a point of the compass ⟨from what ~ will the attack come⟩ ⟨protests poured in from all ~*s*⟩; *also* : a point of view or an angle from which something may be considered ⟨the three authors attack the same subject from three different ~*s*⟩ f : the angle between a true north-south line passing through the position of the observer and a great circle passing through both this position and a given point on the surface of the earth : BEARING g : the path of either the longest straight line that can be drawn along a sheet or band of paper or a straight line crossing this at right angles from edge to edge 6 a : a channel or direct course of thought or action ⟨the outbreak of war gave another ~ to his activities⟩ ⟨the ~*s* in which voters can express their will are limited⟩ ⟨with business expanding in all ~*s*⟩ b : a course of progress, development, or evolution showing a distinct tendency or trend ⟨his latest

beard on the human face ⟨a slender lad w... ⟨a trace of ~ on his cheeks⟩; *also* : fine soft hair elsewhere on the body ⟨tanned arms lightly covered with a silvery ~⟩ **b** : the pubescence of a plant ⟨wipe the ~ off the peaches⟩; *also* : a soft tuft (as a coma or pappus) on some plant part **c** : soft fur fiber usu. from the undercoat of an animal **d** : a fine powdery coating or surface (a ~ of crystals) — **in the down** *of a young bird* : covered with down

²down \"\ *vt* -ED/-ING/-S : to cover, ornament, line, or stuff with down : make downy ⟨a mouse ~*ed* in its winter coat —Herbert Gold⟩

³down \"\ *adj, usu cap* [fr. *Down*, county of Northern Ireland] : of or from County Down, Northern Ireland ; of the kind or style prevalent in County Down

dow-na \'dau̇nə\ [*dow* + *na*] *chiefly Scot* : CANNOT

down-along \'=ə'=\ *adv, dial* : down the length of something (as a coast or road) : to or at a point in the distance

¹down-and-out \'=ən'=\ *adj* [*down* + *and* + *out*, adj.] **1** : so weakened, disabled, or incapacitated as to be ineffective : broken in health **2** : suffering irrecoverably from financial losses or deficiencies **3** *of a boxer* : so broken down by past beatings as to be incompetent as a pugilist

²down-and-out \"\ *n* -S [*down-and-out*] **1** *also* **down-and-out-er** \-ə(r)\ [*down-and-outer* fr. *down-and-out* + *-er*] : a person who is down-and-out **2** : the play or discard in bridge of a high card of a nontrump suit followed by a lower card of the same suit to indicate ability to trump if a third round of the suit is led

down-at-heel \'=ə'=\ *or* **down-at-the-heel** \'=ə=\ *also* **down-at-heels** \'=ə'=\ *or* **down-at-the-heels** \'=ə=\ *adj* : marked by a slovenly slipshod condition or having a threadbare faded appearance : SHABBY ⟨loneliness gnawed at the lives of all the guests in . . . a *down-at-the-heel* private hotel in an English seaside town —Pamela Taylor⟩ ⟨occurred to him that he was *down-at-heel*, dingy —Martha Gellhorn⟩ ⟨should have to pass the hat round or try dressed like a *down-at-heels* corner boy⟩ to get some sort of job —Nicholas Monsarrat⟩

downbear \(')ə'=\ *vt* [ME *dounberen*, fr. *doun* down + *beren* to bear, carry — more at DOWN, BEAR] *archaic* : to bear down : DEPRESS : press upon

¹downbeat \'=ə\ *n* **1** : the downstroke of the conductor indicating the first stressed beat of a musical composition; *also* : any first beat : THESIS **2** : an ictus or arsis : STRESS **3** : a decline in activity or prosperity : depressed condition

²downbeat \"\ *adj* : PESSIMISTIC, GLOOMY, UNHAPPY ⟨a movie with a ~ ending⟩

down-beater \'=ə=ə(r)\ *n* [*down* + *beater*] : a rotating device used on a combine to beat down the moving grain and help to feed it uniformly to the cylinder

downbend \'=ə\ *n* : a depression (as in the bed of the sea) due to downward bending of the earth's crust

downbent \'=ə\ *adj* : bowed or drawn downward ⟨~ trees marked the path of the storm⟩ ⟨a tired ~ old man⟩

downbound \'=ə\ *adj* : heading or leading in any direction that is conventionally down ⟨a ~ channel⟩ ⟨~ traffic⟩

down-bow \'=ˌbō\ *n* : a stroke in playing a bowed instrument (as a violin) from the heel toward the point of the bow — contrasted with *up-bow*; symbol ∧ or ⊓

downbuckle \'=ə=\ *n* : a generally long and relatively narrow portion of the earth's crust that has been bent sharply downward — **downbuckling** \'=ə(=)ə'=\ *n*

down-budding \'=ə'=\ *n* : a method of budding in which the scion is inserted in an inverted position

downbye *also* **downby** \(')dau̇nˌbī\ *adv* [*down* + *by*, adv.] *Scot* : down that way : down below

down calver *n* [*down* + *calve* + *-er*] *Brit* : a down-calving cow

down-calving \'=ˌ=\ *adj* [*down* + *calving*, fr. pres. part. of *calve*] *Brit* : nearly ready to calve

down card \'=ə=\ *n* -S : a card dealt face down in any card game in which certain other cards are dealt face up **2** : a card that is part of a player's hand but is left face down on the table while other of his cards are exposed **3** : HOLE CARD

¹downcast \(')=ə'=\ *vt* [ME *douncasten*, fr. *doun* down + *casten* to cast — more at DOWN, CAST] *archaic* : OVERTHROW, DEMOLISH; *also* : DEJECT

²downcast \'=ə=\ *n* [ME *douncost*, fr. *douncasten*, v.] **1** : a casting down : OVERTHROW **2** : a downcast or melancholy glance or appearance **3** : a ventilating shaft down which fresh air passes in circulating (as through a mine or the hold of a ship); *also* : the current of air through the shaft

³downcast \'=ə=\ *adj* [fr. past part. of *¹downcast*] **1** : low in spirit : DEPRESSED, DISPIRITED, DEJECTED **2** *of looks* : cast downward : directed to the ground (as from bashfulness modesty, dejection, or guilt) **3** : having a downward draft ⟨a ~ mine shaft⟩

SYN DISPIRITED, DEJECTED, DEPRESSED, DISCONSOLATE, WOEBEGONE: DOWNCAST suggests utter lack of cheer, confidence, and hope, perhaps accompanied by shame, chagrin, or bashfulness ⟨their smiling faces became *downcast*, their eyes held a look of furtiveness and uneasiness —Francis Birtles⟩ DISPIRITED indicates low-spiritedness and discouragement, usu. after failure or disappointment ⟨they could make no impression, and fell back at daybreak beaten and *dispirited* —J.A.Froude⟩ ⟨a fragile, *dispirited* gentlewoman who appeared to find everything in the world immeasurably sad and who spoke mostly in the past tense —Jean Stafford⟩ DEJECTED may imply more utter lowering of spirits and remarkable loss of hope, courage, and strength ⟨timorous and *dejected*, apprehending themselves to be haunted and possessed with vengeful spirits —William Bartram⟩ DEPRESSED implies a sinking under heavy burdens, often economic ones; it may describe chronic underprivilege or indicate psychological incapacity for hope, gladness, or even purposive activity ⟨the *depressed* populations of the ghettos of the Middle East and North Africa —John Hersey⟩ ⟨*depressed* by his failures and contemplating suicide⟩ ⟨*depressed* and stolid after the manic phase⟩ DISCONSOLATE describes one so utterly dispirited that he cannot be consoled, comforted, or encouraged ⟨the Jews sat *disconsolate* on the poop; they complained much of the cold they had suffered —George Borrow⟩ ⟨the *disconsolate* frown of a hunter who has seen nothing but warblers all day —James Thurber⟩ WOEBEGONE describes the appearance of dejection and defeat, sometimes lugubrious ⟨officers, seamen, and prisoners alike, we were as gaunt and *woebegone* a crowd as had ever been cast ashore from a shipwrecked vessel —C.B.Nordhoff & J.N.Hall⟩

down-cast-ness *n* -ES : the quality or state of being downcast

down-come \'dau̇nˌkəm\ *n* -S [ME (Sc) *douncome*, fr. ME *doun* down + *come* action of coming, after, (influenced by *comen* to come) of *kime*, fr. OE *cyme*, fr. *cuman* to come — more at DOWN, COME] **1** *archaic* : a coming down : DESCENT : sudden fall : DOWNFALL : OVERTHROW **2** : DOWNCOMER **3**

downcomer \'=ə=ə\ *n* [*down* + *comer*] : a pipe to conduct something downward: as **a** : a pipe for leading the hot gases from the top of a blast furnace downward to the dust collectors and flue system — see BLAST FURNACE illustration **b** : a tube larger in diameter than the water tubes in some watertube boilers to conduct water from each top drum to a bottom drum under the influence of thermal circulation

downcountry \'=ˌ=ə=\ *adv (or adj)* [*down* + *country*] : in, toward, or of the seaboard or peripheral regions of an area

downcourt \'=ˌ=\ *adv (or adj)* : in or into the direction of the goal (as in basketball)

downcry \(')=ˌ=\ *vt* : to cry down : DISPARAGE

downcurved \'=ˌ=\ *adj* : curved downward esp. at the end — used of projecting parts ⟨the long ~ bill of the curlew⟩

downcut \(')=ˌ=\ *vb* : to cut down or downward by or as if by erosion — used chiefly as a present participle and esp. in distinguishing between downward and lateral stream erosion

downdale \'=ˌ=\ *adv* : DOWNHILL

downdraft \'=ˌ=\ *n* -S *often attrib* : a downward current of air or other gas (as in a mine shaft, kiln, or carburetor or during a thunderstorm)

down east \(')=ˌ=\ *adv (or adj), often cap D&E* : in or into the northeast coastal section of the U.S. and parts of the Maritime Provinces of Canada; *specif* : in or into coastal Maine

down east-er \dau̇'nēstə(r)\ *n, often cap D&E* **1** : one born or living down east **2** : a ship built down east; *esp* : a sailing ship from Maine

downed *past of* DOWN

down-er \'dau̇nə(r)\ *n* -S [*¹down* & *²down* + *-er*] : one downs or that takes, brings, gets, or puts down; *esp* : a weak, sick, or crippled animal in a shipping load that is down and unable to rise

downface \(')=ˌ=\ *vt* [*down* + *face*, v.] : CONTRADICT

down-faced \'=ˌ=\ *adj* : having a continuous slope from forehead top to end of muzzle or bill with little or no stop — used of domestic mammals and birds; compare DISH-FACED

downfall \'=ˌ=\ *n* -S [ME *downfal*, fr. *doun* down + *fal* fall — more at DOWN, FALL (noun)] **1 a** : a sudden fall from high estate, power, reputation, or happiness : DESTRUCTION, RUIN ⟨the ~ of the government⟩ **b** : a fall (as of snow or rain) esp. when sudden or heavy : DESCENT **2** *a archaic* : a precipitous descent : ABYSS **b** : a trap having some device that falls and imprisons or injures the prey when the trap is sprung — compare DEADFALL **c** : something that causes a downfall (as of a person) ⟨drink was his ~⟩

downfallen \'=ˌ=ə=\ *adj* [*down* + *fallen*] : FALLEN, RUINED

downfalling \'=ˌ=ə=\ *adj* [*down* + *falling*, adj.] *archaic* : falling down : DECAYING

downfaulted \'=ˌ=ə=\ *adj* [*down* + *faulted*, fr. past part. of *fault*] *of a geological formation* : lowered by faulting

downfield \'=ˌ=\ *adv (or adj)* [*down* + *field*] : in or into the part of a football field beyond the line of scrimmage toward the opposing team's goal ⟨a play should be planned to allow the ends to get ~ if needed⟩ ⟨effective ~ blocking⟩

downflow \'=ˌ=\ *n* : a downward flow or something that flows down; *esp* : a downward flowing current of air

downflowing \'=ˌ=ə=\ *adj* : running or cascading down

downfold \'=ˌ=\ *n* : SYNCLINE — **downfolded** \'=ˌ=ə=\ *adj*

down-gone \'dau̇nˌgȯn *also* -gän\ *adj* [prob. alter. (influenced by *²down* and *gone*, past part. of go) of *²doggone*] *dial* : in poor condition : DISTRESSED; *often* : DARNED, DOGGONE

¹downgrade \'=ˌ=\ *n* [*¹down* + *grade*, n.] **1** : a downward grade (as of a road) **2** : a descent toward an inferior state : DETERIORATION — used esp. in the phrase *on the downgrade* **3** **downgrade** \'=ˌ=\ *adv (or adj)* : DOWNHILL ⟨the road dips ~⟩ ⟨the crossing where the ~ freights hit so many buggies and teams —Wright Morris⟩

²downgrade \(')=ˌ=\ *vt* [*²down* + *grade*, v.] **1** : to minimize or depreciate in grade ⟨the folly of *downgrading* Soviet technology⟩ ⟨those countries preparing to ~ their commitments to NATO⟩ **2 a** : to lower the market class of (as grain or produce) esp. because of impurities or defects ⟨several carlots of wheat were *downgraded* for excessive cockle⟩ **b** : to alter the status of (a workman or his job) so as to lower the rate of pay ⟨older workers may often be kept employed by *downgrading* them to jobs that they are still able to handle⟩ ⟨any major shift in production or methods is likely to require extensive *downgrading* of jobs⟩ **3** : to assign (as a document) to a less restricted classification of security

downgrowth \'=ˌ=\ *n* : the growing downward of a structure; *also* : the product of such growth

down-gyved *adj* [*down* + *gyved*, fr. past part. of *gyve*] *obs* : hanging down like gyves

downhand \'=ˌ=\ *adj* [prob. fr. *³down* + *hand*, n.] *of welding* : performed from the upper side of the joint with the face of the weld approximately horizontal

downhaul \'=ˌ=\ *n* [*down* + *haul*, v.] : a rope or line for hauling down or holding down a sail or spar (a staysail ~)

downhearted \'=ə=ə\ *adj* : DEJECTED — **down-heart-ed-ly** \(')=ˌ=\ *adv*

down-heart-ed-ness *n* -ES : the quality or state of being downhearted

¹downhill \'=ˌ=\ *n* [*down* + *hill*] **1** *a archaic* : the slope toward the bottom of a hill : DECLIVITY, DESCENT **b** : a descending gradient (as in circumstances or human existence) ⟨the tragic ~*s* that bring many promising careers to an end⟩ **2** [*²downhill*] : a competitive ski event consisting of skiing down a trail against time

²downhill \'=ˌ=\ *adv* [*down* + *hill*] **1** : toward the bottom of a hill ⟨traveling ~ we really got up speed⟩ **2** : toward a lower, poorer, or inferior state or level — used esp. in the phrase *go downhill* < the town has gone ~ since the mill closed⟩ ⟨after he retired he went ~ very rapidly⟩

³downhill \'=ˌ=\ *adj* [*²downhill*] **1** : sloping downhill **2** [*¹downhill* 2] : of, relating to, or designed for use in skiing downhill ⟨a leading ~ contestant⟩ ⟨attractive ~ trousers⟩

downhill turn *n* : any skiing turn down the slope from a traverse run

downhold \'=ˌ=\ *n* : an act of minimizing (as of expenses) ⟨a stringent ~ on cable tolls⟩

down-house \'=ˌ=\ *adv* [*down* + *house*] *dial Brit* : DOWNSTAIRS

downier *comparative of* DOWNY

downiest *superlative of* DOWNY

down-i-ly \'dau̇nᵊlē, -nəlē\ *adv* : in a downy manner : ARTFULLY

down-i-ness \'dau̇nēnəs, -aünə-\ *n* -ES : the quality or state of being downy

downing *pres part of* DOWN

dow-nin-gia \dau̇'niŋ(g)ēə\ *n, cap* [NL, fr. Andrew J. *Downing* †1852 Am. horticulturist + NL *-ia*] : a small genus of annual dwarf American herbs (family Lobeliaceae) with alternate leaves and showy sessile flowers having an unsplit corolla tube

down-in-the-mouth \'=ən=ˌ=\ *adj* : DEPRESSED, DOLOROUS

down-land \'=ˌland\ *n* : ²DOWN 2

down-lead \'=ˌlēd\ *n* : a radio lead-in

down-less \'=ləs\ *adj* : having or growing no down ⟨a ~ chick⟩

downlight \'=ˌ=\ *n* : a small spotlight set in the ceiling and directed downward

downline \'=ˌ=\ *adv* [*²down* + *line*, n.] : down the railway line

down lock *n* : a device in an airplane that locks the landing gear in the down position after it has been lowered

down-looked \'=ˌlu̇kt\ *adj* [*down* + *look*, n. + *-ed*] *archaic* : downcast in countenance as or as if from guilt : SHEEPISH

downlying \'=ˌ=ə\ *n* -S [*down* + *lying*, fr. gerund of *lie*] **1** *now dial Eng* : the time or act of going to bed : time of repose **2** *also* **down-lig-ging** \'=ˌligə\, -giŋ\ [*downligging* fr. *²down* + *ligging*, fr. gerund of *lig*] *chiefly Scot* : LYING-IN

down milling *n* [*down* + *milling*] : CLIMB MILLING

down-most \'=ˌmōst *sometimes chiefly Brit* -məst\ *adv (or adj)* : farthest down

down-ness \'dau̇nəs\ *n* -ES : the state or condition of being down

downpipe \'=ˌ=\ *n, Brit* : DOWNSPOUT

downpour \'=ˌ=\ *n* : a pouring or streaming downward (as of sunlight); *esp* : a heavy drenching

¹downright \'=ˌ=\ *adv (or adj)* [ME *douright*, fr. *doun* down + *right*, adv. — more at DOWN] **1** *archaic* : straight down : in a perpendicular course **2** : OUT-AND-OUT, PLAIN, OUTRIGHT ⟨I was ~ ashamed of our party⟩ ⟨a ~ liar⟩; *sometimes* : VERY : to the utmost degree ⟨the sunset was ~ lovely⟩ **3** : without ceremony : with plain blunt honesty : FORTHRIGHT ⟨a ~ answer⟩ ⟨so ~ a moralist⟩ ⟨he was kind but ~⟩ ⟨went ~ to his task⟩ — **down-right-ness** \'=ˌ=nəs\ *n*

²downright \"\ *n* : an inferior short-staple wool — usu. used in pl.

down-right-ly \'=ˌ=lē, -li\ *adv* [*downright* + *-ly*] : in a straightforward or forthright manner : without hesitation

downriver \'=ˌ=ə=\ *adv (or adj)* [*down* + *river*] : from, toward, or at a point near the mouth of a river ⟨drifted ~ on a raft⟩ ⟨important ~ markets⟩

downs *pl of* DOWN, *pres 3d sing of* DOWN

down-set \'dau̇nˌset\ *n* [*down* + *set*, v.] *Scot* : a provision of money or an establishment; *specif* : MARRIAGE SETTLEMENT

down-sexed \'dau̇nˌsekst\ *adj* [*down* + *sexed*] : having sex appeal minimized ⟨*down-sexed* illustrations⟩

¹downshift \'=ˌ=\ *vi* [*down* + *shift*, v.] : to shift an automotive vehicle into a lower gear (~ into low or second gear⟩

²downshift \"\ *n* : a shift into a lower automotive gear

downside \'=ˌ=\ *n* **1** : the under or lower side ⟨a gaily tilted hat with a decorative clasp on the ~⟩ **2** : a trend downward (as of prices) — used chiefly in the phrase *on the downside*

downside up *adv* : TOPSY-TURVY

downsitting \'=ˌ=ˌ=\ *Scot* \'dau̇n-\ *n* [*down* + *sitting*, fr. gerund of

downslide \'=ˌ=\ *n* : a decline to a lower level (as of prices or business)

¹downslope \'=ˌ=\ *adv* [*down* + *slope*] : in a downward direction : DOWNHILL ⟨khaki-clad figures . . . sliding ~ toward him —Walt Sheldon⟩

²downslope \"\ *adj* : DOWNHILL, DESCENDING ⟨~ winds⟩ ⟨~ movement of ice⟩

³downslope \'=ˌ=\ *n* [*down* + *slope*] : DOWNHILL ⟨he had only to remember to keep the ~ on his right —W.V.T.Clark⟩

downs-man \'dau̇nzmən\ *n, pl* **downsmen** [*downs* (pl. of *down*) + *man*] : a dweller on the downs

down-some \'dau̇n(t)səm\ *adj* : DISPIRITED, DEPRESSED

down south \'=ˌ=\ *adv, often cap S* : in or into a more southerly location ⟨learned about the ways of fish in Canadian waters before he came *down south* —*Sydney (Australia) Bull.*⟩; *esp* : in or into the southeastern part of the U.S.

downspout \'=ˌ=\ *n* : a pipe leading downward; *esp* : a pipe to carry off rain water from a roof

down's syndrome \'dau̇nz-\ *n, cap D* [after J.L.H. *Down* †1896 Eng. physician, who first described it] : MONGOLISM

¹downstage \'=ˌ=\ *adv (or adj)* [*down* + *stage*, n.] : toward or at the front of a theatrical stage ⟨swept her train ~⟩ ⟨bent the ~ knee⟩ — compare UPSTAGE

²downstage \'=ˌ=\ *n* : the front of a stage immediately behind the footlights

¹downstairs \(')=ˌ=\ *adv* [*down* + *stairs*, pl. of *stair*] **1** : down the stairs : on or to a lower floor **2** *aeronautics* : on, near, or to the ground

²downstairs *also* **downstair** \'=ˌ=\ *adj* **1** : situated on the main, lower, or ground floor of a building **2** : placed at or occupying a lower level ⟨the ~ television channels⟩

³downstairs \(')=ˌ=\ *n pl but sing or pl in constr* **1** : the part of the house belowstairs : the lower floor or floors **2** : persons occupying the lower part of a building; *often* : the servants of a household ⟨~ were shocked at such goings on⟩

downstart \'=ˌ=\ *n* [*down* + *-start* (as in *upstart*)] : an Irishman of good birth and upbringing but with little fortune; *often* : a younger son of good family

¹downstate \'=ˌ=\ *adv (or adj)* [*down* + *state*, n.] **1** : into or in a part of a state designated as downstate ⟨the voting was light ~⟩ **2** : characteristic of a part of a state designated as downstate ⟨peculiarities of ~ pronunciation⟩

²downstate \"\ *n* : the more southerly part of a state of the U.S. as distinguished from a northerly part conventionally designated as *upstate* — **down-stat-er** \'=ˌstād-ə(r)\ *n* -S

downstream \'=ˌ=\ *adv (or adj)* [*down* + *stream*, n.] : down a stream ; in the direction of flow of a stream

downstreet \'=ˌ=\ *adv* [*down* + *street*, n.] : to, toward, or in the main retail business section of a town ⟨going ~ after supper⟩

downstroke \'=ˌ=\ *n* **1** : a stroke (as of a piston in a cylinder or of a conductor's baton) made in a downward direction **2 a** : a stroke (as of a handwritten cursive letter) commonly written in a downward direction and in some styles heavier than an upstroke **b** : a correspoonding stroke of a printed letter

downsun \'=ˌ=\ *adv (or adj)* [*down* + *sun*, n.] : in a direction from or out of the sun ⟨a ~ attack by an aircraft⟩

downswing \'=ˌ=\ *n* **1** : a swing downward; *esp* : the forward and downward sweep of a golf club following the backswing **2** : a downward or depressed trend ⟨the ~ in interest in politics⟩ ⟨in the ~ of a cyclic mania⟩; *esp* : the contraction phase of a business cycle

downtake \'=ˌ=,tāk\ *n* [*down* + *-take* (as in *intake*)] : a pipe, duct, or flue (as for air, gas, or water) that leads downward

down-the-line \'=ə=ˌ=\ *adv (or adj)* : all the way : to the end ⟨supporting the party ticket right *down-the-line*⟩ ⟨a *down-the-line* union man⟩

down the river *n, often cap D&R* : SEVEN-CARD STUD

downthrow \'=ˌ=\ *n* **1** : the act or process of throwing down : state of being overthrown : OVERTHROW ⟨the sudden ~ of a reputation⟩ **2** : the side of a geologic fault that moved downward relative to the other side — compare THROW

downthrown \'=ˌ=\ *adj* [*down* + *thrown*, fr. past part. of *throw*] : thrown down : DEPRESSED

downthrust \'=ˌ=\ *n* : downward movement of an object under impact or steady pressure; *also* : an impact or pressure tending to cause downthrust

downtime \'=ˌ=\ *n* [*down* + *time*] **1** : time during which a machine, department, or factory is inactive during normal operating hours (as for repairs or setting up or from lack of materials) **2 a** : a period during which an incentive worker is unable to produce because of plant factors beyond his control and therefore receives payment at an agreed base rate **b** : money paid a worker for downtime

down-to-date \'=ə=ˌ=\ *adj* : UP-TO-DATE

down-to-earth \'=ə=ˌ=\ *adj* : practical and straightforward : having no frills or foibles : REALISTIC

down-to-ni-an \(')dau̇n-ˌtōnēən\ *adj, usu cap* [*Downton*, town in Wiltshire, England + E *-ian*] : of, relating to, or constituting a subdivision of the European Silurian — see GEOLOGIC TIME table

downtown \'=ˌ=\ *adv (or adj)* [*down* + *town*] **1** : to, toward, or in the lower part or business center of a city ⟨his bus goes ~⟩ ⟨delinquents roaming the ~ streets⟩ **2** : relating to or characteristic of the business center of a city ⟨always patronizes ~ stores⟩

²downtown \'=ˌ=\ *n* : the business center of a city ⟨the ~*s* of a hundred cities dressed and lighted for Christmas⟩ — **downtown-er** \'=ˌtau̇nə(r)\ *n* -S

down tree *n* [*down* + *tree*; fr. the thick cottony fibers surrounding the seeds] : BALSA

downtrend \'=ˌ=\ *n* : a tendency downward esp. in economic matters ⟨a persistent ~ in sales⟩

downtrod *obs var of* DOWNTRODDEN

down-trod-den \(')=ˌ=ˌträdᵊn\ *adj* [*down* + *trodden*, fr. past part. of *tread*] : abused by superior power — **down-trod-den-ness** \-ᵊn(n)əs\ *n* -ES

downturn \'=ˌ=\ *n* **1** : an act or instance of turning down ⟨the ~ of an anticlinal fold —W.Y.Westervelt⟩; *also* : the state of being turned down ⟨the ~ of her mouth became a habit —Dorothy Parker⟩ **2** : DECLINE, DECREASE ⟨a sharp ~ in new construction⟩; *usu* : a downward trend in economic matters ⟨the ~ of prices⟩ ⟨business began to show a ~⟩

down-twister \'=ˌ=ə\ *n* : a textile manufacturing machine with downward feeds for plying yarn while adding some twist — compare UP-TWISTER

down under *adv* [*down* + *under*, adv.; fr. the conception of the antipodes as being located beneath one's feet] : into or in Australia or New Zealand

²down under *n, sometimes cap D&U* : ANTIPODE 2

¹down-ward \'dau̇nwə(r)d\ *also* **down-wards** \-dz\ *adv* [*downward* fr. ME *douneward*, fr. *doun* down + *-ward*; *downwards* fr. ME *dounewardes*, fr. *douneward* + *-es* (adverbially functioning gen. sing. ending of nouns) — more at DOWN, -S] **1** : from a higher place to a lower : in a descending course ⟨looking ~ to the grass⟩ ⟨the streams roll ~ to the sea⟩ **2** : from a higher to a lower condition ⟨revised his estimate ~⟩ : toward misery, humility, disgrace, or ruin ⟨fell from grace and went ~ in life⟩ **3** : from a remote or earlier time : from an ancestor or predecessor : from one to another in a descending line ⟨prophets from Elijah ~ who preached repentance⟩

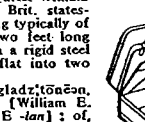
²downward \"\ *adj* [ME *douneward*, fr. *douneward*, adv.] **1** : moving or extending from a higher to a lower place : tending toward the earth or its center or toward a lower level ⟨the ~ pull of gravity⟩ **2** : descending from a head, origin, or source ⟨a ~ line of descent⟩ ⟨the ~ course of a stream⟩ **3** *a archaic* : tending to a lower state : DEJECTED **b** : directed toward or leading to ruin, destruction, or damnation ⟨a man on the ~ path⟩ ⟨took her ~ way⟩ **c** : DEBASING ⟨the scripture contains many ~ comparisons of man and his ways⟩ **4** *archaic* : being below : LOWER — **down-ward-ly** *adv* — **down-ward-ness** *n* -ES

¹downwarp \(')=ˌ=\ *vb* [*down* + *warp*, v.] *vt* : to cause or produce a downwarp in — *vi* : to undergo downwarping

²downwarp \'=ˌ=\ *n* : a broad generally shallow geological downfold

downwash \'=ˌ=\ *n* **1** : material washed downward (as

glad·stone \'gladz,tōn, -d,st-, *chiefly Brit* -ˌt ... **bag** *n -s often cap G* [after William E. *Gladstone* †1898 Brit. statesman] : a traveling bag typically of leather and about two feet long with flexible sides on a rigid steel frame and opening flat into two equal compartments


gladstone

glad·sto·ni·an \(ˈ)gladzˈtōnēən, -dˌst-\ *adj, usu cap* [William E. *Gladstone* † 1898 + E *-ian*] : of, relating to, or characteristic of W.E.Gladstone, his political policies, or the party that supported him

glady *also* **glad·ey** \'glādē\ *adj* **gladier; gladiest** [*glade* + *-y*] **1 a** : having glades; *esp* : full of glades (a ~ countryside) **b** : resembling a glade (it was a ~ place, and ferns and moss grew all around —H.E.Giles) **2** : having a shallow soil and limestone outcrops (extensive ~ areas wherein well-preserved fossils are abundant —*Jour. of Geol.*)

gla·gah *or* **gla·ga** \'glägə\ *n -s* [Malay *gĕlagah*] : KANS

glag·o·lit·ic \ˌglägōˈlid·ik\ *also* **glag·o·lith·ic** \-ˈlithik\ *adj, usu cap* [irreg. fr. Serbo-Croatian *glagolica* Glagolitic alphabet + E *-ic*] : written in, constituting, or belonging to an alphabet of which the invention is attributed to St. Cyril in the 9th century A.D. and which was formerly used in writing various Slavic languages but is now used only in Catholic liturgical books in a limited area along the eastern coast of the Adriatic — compare CYRILLIC ALPHABET

gla·go·li·tsa \ˌglägōˈlēt͡sə, -ˌt͡sä\ *n -s usu cap* [Serbo-Croatian *glagolica*: akin to OSlav *glagolŭ* word, *glasŭ* voice — more at CALL] : the Glagolitic alphabet

glaik \'glāk\ *n -s* [origin unknown] **1** *chiefly Scot* : derisive deception : MOCKERY **2** *chiefly Scot* : a flash of light

glai·kit *or* **glai·ket** *or* **gla·ked** \'glākət, -dd\ *adj* [ME (Sc) *glaikit, glakit*] *chiefly Scot* : showing a lack of common sense and good judgment : FOOLISH, SILLY, OIDDY

¹glair *or* **glaire** \'gla(ə)(ə)r, -leˌ, -leˌə\ *n -s* [ME *gleyre* white of an egg, fr. MF *glaire*, fr. OF, modif. of (assumed) VL *claria*, fr. L *clarus* clear — more at CLEAR] **1** : a sizing liquid made from egg white beaten with vinegar and applied to book covers before laying on gold leaf or to book edges before gilding **2** : a viscid or slimy substance suggestive of the white of an egg

²glair *or* **glaire** \"\ *vt* -ED/-ING/-S : to apply glair to (~*ed* book edges)

glair·e·ous \'lerēəs\ *adj* [*glair* + *-eous*] *archaic* : GLAIRY

glair·i·ness \'lerēənəs\ *n* -ES : the quality or state of being glairy

glairy \'lerē\ *adj* -ER/-EST [*glair* + *-y*] **1** : having the characteristics of glair : VISCID, SLIMY (~ mucus) **2** : overlaid with or as if with glair (a sticky ~ surface)

glais·tig *or* **glas·tig** \'glashtiɡ\ *n -s* [ScGael *glaistig*] : a female sprite in Celtic mythology

glaive \'glāv\ *n -s* [ME *glaive, gleyve*, fr. OF *glaive* javelin, modif. of L *gladius* sword — more at GLADIATOR] **1** *obs* : HALBERD **2** *archaic* : SWORD; *esp* : BROADSWORD

glaiz·ie \'glāzi\ *Scot var of* GLAZY

glam \'glam\ *var of* GLAUM

gla·mor·gan·shire \gləˈmȯrgənˌshi(ə)r, -ˌshər\ *or* **glamorgan** *adj, usu cap* [fr. *Glamorganshire, Glamorgan*, county in Wales] : of or from the county of Glamorgan, Wales : of the kind or style prevalent in Glamorgan

glam·or·i·za·tion \ˌglamərəˈzāshən, -ˌrīˈz-\ *n -s* : the act of glamorizing or the process of being glamorized

glam·or·ize *also* **glam·our·ize** \'ˈəˌrīz\ *vt* -ED/-ING/-S **1** : to make glamorous : add glamour to : make more attractive esp. in a superficial illusory way (*glamorizing* a living room) **2** : to attribute glamour to : look upon as glamorous : view or treat (as in writing) romantically : IDEALIZE, ROMANTICIZE, GLORIFY (*glamorizing* war) (poverty *glamorized* into something alluring —Rose Thurburn) — **glam·or·iz·er** \-zə(r)\ *n -s*

glam·or·ous *also* **glam·our·ous** \'glam(ə)rəs\ *adj* : characterized by or full of glamour : FASCINATING, ENCHANTING, ALLURING (~ movie stars) — **glam·or·ous·ly** *adv* — **glam·or·ous·ness** *n* -ES

¹glam·our *or* **glam·or** \'glamə(r)\ *n -s* [Sc *glamour, glamer*, alter. of E *grammar*; fr. the popular association of erudition with occult practices] **1** : a magic spell : BEWITCHMENT (the girls appeared to lie under a ~ —Llewelyn Powys) (casting a ~ over the affairs of merchant princes —O.S.J.Gogarty) **2** : an elusive mysteriously exciting and often illusory attractiveness that stirs the imagination and appeals to a taste for the unconventional, the unexpected, the colorful, or the exotic (the ~ of the French Foreign Legion) : a strangely alluring atmosphere of romantic enchantment (a beautifully decorated room that was filled with ~) : a bewitching intangible irresistibly magnetic charm (it was simply the ~ of the unknown that she had felt in him —Ellen Glasgow); *often* : personal charm and poise combined with unusual physical and sexual attractiveness (an actress radiant with ~)

²glamour \"\ *vt* glamoured; glamoured; glamouring \-m(ə)riŋ\ glamours [Sc, fr. *glamour, glamer*, n.] **1** : to cast a magic spell upon : BEWITCH (soon created such a realm of gorgeous marvel as ~*ed* the age with fantasy —H.B.Alexander) **2** : GLAMORIZE (*glamoured*-up blondes were a dime a dozen — Raymond Chandler)

glamour boy *n* : a man (as an actor or adventurer) with whom glamour is esp. associated

glamour girl *n* : a woman (as an actress or model) with whom glamour is esp. associated

glam·ou·rie *or* **glam·ou·ry** \-mərē\ *n, pl* **glamouries** [Sc, alter. of *glamour, glamer*, n.] *archaic* : GLAMOUR I

glam·our·less \-mə(r)ləs\ *adj* : devoid of glamour (she was handsome in her ~ way —Edmund Wilson)

glamour puss *n, slang* : one that has a glamorously attractive face (some *glamour puss* with two expressions and eighteen changes of costume —Raymond Chandler)

¹glance \'glan(t)s, -aə(ə)-,-ai-,-ä-\ *vb* -ED/-ING/-S [alter. of ME *glencen, glenchen*, perh. alter. of *glenten* to move quickly esp. in an oblique direction, strike something obliquely and glance aside, look sideways at something, gleam — more at GLENT] *vi* **1 a** (1) : to strike a surface obliquely so as to be deflected and go off at an angle : RICOCHET — usu. used with *off* (the spear *glanced* off the heavy metal shield) (the bullet *glanced* off the stone wall and smashed through a window) (2) : to strike a surface obliquely and bounce off at an angle often following with one or more additional oblique impacts and forward bounds : SKIP (threw the small flat stone so that it *glanced* lightly across the pond) (3) *of a ray of light* : to strike a reflecting surface obliquely and dart out at an angle (light from the setting sun *glanced* off the oil tanks — Malcolm Lowry) **b** (1) *obs* : to move swiftly (as in springing or dodging) esp. in an oblique or crosswise direction (2) : to make a glance in cricket **c** *archaic* : to move swiftly (as in speaking or writing) from one subject to another **2 a** (1) : to flash or gleam with quick intermittent rapidly successive rays of light (as those produced by sudden quick movements of a reflecting surface) : SPARKLE, SCINTILLATE, CORUSCATE (clear mountain brooks *glancing* brightly in the morning sun) (2) : to make sudden quick movements that cause quick intermittent flashes of light (as from a moving reflecting surface) (dragonflies *glancing* and zigzagging over the pond) **b** : to shine with a steady dazzling radiance : BEAM (the *glancing* sun) **3 a** : to touch briefly or indirectly on a subject (as in speaking or writing) : make an incidental reference : make an allusion — usu. used with *at* (a book on contemporary civilization that often ~s at the customs of ancient cultures) **b** : to refer briefly to something by way of censure or satire : cast discredit on something in a passing reference (full of sly, *glancing* allusions to life as it is lived today —Gerald Bullett) **4 a** *of the eyes* (1) : to move swiftly from one thing to another (his eyes *glanced* from the judge to the jury and back again) (2) *archaic* : to light upon something by or as if by chance (her eye *glanced* on something which made her change color —T.L.Peacock) **b** : to take a quick look at something (*glancing* at the morning headlines) : look briefly, hurriedly, or cursorily (*glanced* about as though fearful of being overheard —Sherwood Anderson) : look around here and there : make a quick inspection (the bar, where we *glanced* first, was crowded —Scott Fitzgerald) ~ *vt* **1 a** *obs* : to turn (the eyes or gaze) quickly aside or away **b** *archaic* : to turn (the eyes or gaze) quickly or briefly toward something **c** *archaic* (1) : to take a quick look at : view quickly : survey rapidly (2) : to catch a glimpse of **2** *obs* **a** : to allude to **b** : to barely touch : GRAZE **3** : to give an oblique path of direction to: **a** : to throw (as a spear or stone) or shoot (as a bullet) so that the object thrown or shot glances from a surface **b** *archaic* : to aim (as an innuendo) indirectly : INSINUATE **4** *archaic* : to cause the reflection of (*glanced* back the flame of the lamp merrily —Walter Scott) **5** : to play (a bowled cricket ball) with a glance

²glance \"\ *n -s* **1 a** (1) : a quick intermittent flash or gleam of light (as one produced by sudden quick movements of a reflecting surface) (the ~ of a brightly polished sword) (2) *archaic* : a sudden quick movement (as of a reflecting surface) that produces flashes or gleams of light **b** : a ray of light shining with a steady radiance : BEAM (the first ~ of sunlight sends the snow slithering in soft cascades —Adrian Bell) **2 a** *archaic* : a rapid oblique or crosswise movement **b** *archaic* : a deflected impact or blow **c** : a stroke in the game of cricket made with a slanted bat that deflects the ball to leg **3 a** : a swift movement of the eyes from one thing to another (the suspect's shifting ~) **b** : a quick, brief, hurried, or cursory look (the two old ladies darting ~*s* at us and smiling secretively —William Thornton) (museums in which pictures of a single style or artist can be compared and enjoyed at a ~ — R.J.Goldwater) (it was clear at first ~ that his condition was serious —T.B.Costain) **4** *archaic* **a** : a brief satirical or censorious reference to something : GIBE **b** : a brief incidental reference : ALLUSION

³glance \"\ *n -s* [G *glanz* mineral sulfide, luster, shine] : any of several mineral sulfides that are mostly dark colored and have a metallic luster

⁴glance \"\ *vt* -ED/-ING/-S [prob. fr. D *glanzen* to polish, gleam, fr. MD *glansen* to gleam, fr. *glans*, n., luster, shine, fr. MHG *glanz*, fr. OHG, fr. *glanz*, adj., bright — more at GLENT] : to give a high luster to (as by burnishing)

glance coal \"~\ *n* [trans. of G *glanzkohle*, fr. *glanz* luster, shine + *kohle* coal] : a hard lustrous coal; *esp* : ANTHRACITE

glance pitch *n* [*glance*] : a pure asphalt — compare MANJAK

glanc·er \-sə(r)\ *n -s* [*glance* + *-er*] : FENDER SKID

glancing *adj* [fr. pres. part. of *¹glance*] **1** : INCIDENTAL, INDIRECT (the book has a variety of ~ references to prominent personalities) **2** : CASUAL, UNSTUDIED, OFFHAND (a citizen of the world who knew the Near East with the same ~ familiarity —H.V.Gregory) (he evoked the town and its surrounding countryside with his habitual ~ art —*Times Lit. Supp.*) — **glanc·ing·ly** *adv*

glancing angle *n* [*glancing* fr. gerund of *¹glance*] : the angle between an incident beam (as of X rays or electrons) and the surface upon which it is incident ; the complement of the angle of incidence

glancing boom *n* : FENDER BOOM

gland \'gland, -aa(ə)-\ *n -s* [F *glande* gland (organ of secretion), glandular swelling esp. on the neck, fr. MF, acorn, gland (organ of secretion), glandular swelling esp. on the neck, fr. OF, acorn, glandular swelling esp. on the neck, fr. *glant, gland* acorn, fr. L *gland-, glans*; akin to Gk *balanos* acorn, Lith *gilė*] **1 a** : a cell or group of cells that selectively removes materials from the blood, concentrates or alters them, and secretes them for further use in the body or for elimination from the body and that typically consists of columnar or cuboidal epithelium resting on a basement membrane and is surrounded by a plexus of blood vessels — see ENDOCRINE, EXOCRINE, HOLOCRINE, MEROCRINE **b** : any of various animal structures suggestive of glands though not glandular in function: as (1) : LYMPH GLAND (2) : GLANS **c glands** *pl* : a diseased or inflamed condition of glands (as the lymph or salivary glands of the neck) **2 a** : any of various special secreting organs of plants: as (1) : one or more of the hairs on the leaves of sundew (2) : one or more of the extrafloral nectaries of many plants **b** : any of certain small protuberances of plants (as on the petiole of a peach leaf)

²gland \"\ *n -s* [origin unknown] **1** : a device (as a series of carbon rings or of interlocking teeth) for preventing leakage of steam, water, gas, or other fluid past a joint (as in machinery); *specif* : the movable part of a stuffing box by which the packing is compressed **2** : a short tube fitted to the envelope of a balloon or airship so that a rope may slide through without causing leakage

glan·dered \'glandə(r)d, -laan- *sometimes* -lān-\ *adj* : affected with glanders (a ~ horse)

glan·der·ous \-d(ə)rəs\ *adj* **1** : GLANDERED **2** : produced by or resembling the effects of glanders (a ~ condition)

glan·ders \-də(r)z\ *n pl but sing or pl in constr* [MF *glandres*, pl. of *glandre* glandular swelling esp. on the neck, fr. OF, fr. L *glandula*, dim. of *gland-, glans* acorn] : a highly contagious and very destructive disease of horses and other equines or sometimes of other animals (as dogs, guinea pigs, or man) that is caused by a bacterium (*Actinobacillus mallei* syn. *Malleomyces mallei* or *Pfeifferella mallei*) and that is characterized by caseating nodular lesions which tend to break down and form ulcers in mucous membranes, skin, and visceral organs and esp. in lymph nodes and along the course of lymphatic vessels and which may be accompanied by fever and edema and secondary symptoms referable to pulmonary, gastrointestinal, or other special organ involvement — compare FARCY

glandes *pl of* GLANS

gland·less \'glandləs, -laan-, *rapid* -nl-\ *adj* : devoid of glands

gland of bar·tho·lin \-ˌbärˈtōlən\ *usu cap B* [after Kaspar *Bartholin* †1738 Dan. physician] : either of two oval racemose glands lying one on each side of the lower part of the vagina and secreting a lubricating mucus

gland of bow·man \-ˈbōmən\ *usu cap B* [after Sir William *Bowman* †1892 Eng. ophthalmic surgeon] : any one of the tubular and often branched glands occurring beneath the sensory epithelium of the nose

gland of brunner *usu cap B* : BRUNNER'S GLAND

gland of cowper *usu cap C* : COWPER'S GLAND

gland of external secretion : EXOCRINE GLAND

gland of internal secretion : ENDOCRINE GLAND

gland of lieberkühn *usu cap L* : LIEBERKÜHN'S GLAND

gland of moll \-ˈmōl, -ō-,-ȯ-\ *usu cap M* [after Jacob A. *Moll* †1914 Du. ophthalmologist] : any of the small glands near the free margin of each eyelid regarded as modified sweat glands

gland of ty·son \-ˈtīsᵊn\ *usu cap T* [after Edward *Tyson* †1708 Eng. anatomist] : any of the small glands at the base of the glans penis that secrete smegma

glands *pl of* GLAND

glan·du·la \'glanjələ\ *n, pl* **glandu·lae** \-ˌlē, -ˌlī\ [NL, fr. L, glandular swelling esp. on the neck] : ¹GLAND I; *esp* : a small gland

glan·du·lar \-lə(r)\ *adj* [F *glandulaire*, fr. *glandule* glandula, fr. L *glandula*] **1 a** (1) : of, relating to, or involving glands or gland cells (~ cancer) (~ functions) (2) : derived from glands or gland cells (~ secretions) **b** : having the characteristics or function of a gland (~ tissue) **c** : containing, bearing, or made up of glands or gland cells (~ organs) **2 a** : controlled or influenced by the secretions of glands; *esp* : resulting from abnormal functioning of glands (the theory of ~ criminal behavior) **b** : INNATE, INHERENT, INSTINCTIVE (he had grown up with a ~ dislike for everything pretentious) **c** : EARTHY, PHYSICAL; *esp* : SEXUAL (he has adopted, as an interim substitute for love, an entirely ~ relationship with the proprietress of his café —W.M.Frohcok) — **glan·du·lar·ly** *adv*

glandular epithelium *n* : the epithelium that forms the secreting surface of a gland

glandular fever *n* : INFECTIOUS MONONUCLEOSIS

glan·du·lif·er·ous \ˌglanjəˈlifərəs\ *adj* [obs. E *glandule* glandula, glandular swelling esp. on the neck (fr. MF, glandula) + E *-i-* + *-ferous*] : bearing small glands

glan·du·los·i·ty \ˌglanjəˈläsəd·ē\ *n -ES* [L *glandulosus* glandulous + E *-ity*] : the quality or state of being glandulous

glan·du·lous \'glanjələs, -laan-\ *adj* [ME *glandeleus*, fr. MF *glanduleus*, fr. L *glandulosus*, fr. *glandula* + *-osus* -ose] : GLANDULAR — **glan·du·lous·ness** *n -ES*

gla·nen·che·li \gləˈnenkəˌlī\ *n pl, cap* [NL, fr. *glan-* (fr. Gk *glanis* sheatfish) + *-encheli* (fr. Gk *enchelys* eel) — more at ANGUIS] *in some classifications* : a suborder of Ostariophysi comprising the electric eels

an·i·os·to·mi \ˌglanē'ästəˌmī\ *n pl, cap* [NL, fr. *glanio-* (fr. Gk *glanis*) + *-stomi*] *in some esp former classifications* : an order of fishes consisting of the sturgeons

glans \'glanz, -aa(ə)-\ *n, pl* **glan·des** \-nˌdēz\ [L *gland-, glans* acorn, glans penis — more at GLAND] **1** *a or* **glans pe·nis** \-ˈpēnəs\ : a conical vascular body forming the extremity of the penis **b** *or* **glans cli·to·ri·dis** \-klīˈtȯrədəs, -klīˈt-\ : a conical vascular body forming the extremity of the clitoris **2** : a nut enclosed by or seated in an involucre

glar \'glär\ *var of* GLAUR

glare \'gla(ə)(ə)r, 'gleˌ, -leˌə\ *vb* -ED/-ING/-S [ME *glaren*; akin to MD & MLG *glaren* to gleam, glare, OE *glæs* glass — more at GLASS] *vi* **1 a** : to shine esp. by reflection with a harsh uncomfortably brilliant light (the heat was terrific, the pavements *glared* —Aldous Huxley) (the town was baking and *glaring* in the somniferous New York heat —Edmund Wilson) : shine with an intense disagreeable brightness (the sun *glared* down relentlessly) (a single naked bulb *glared* pitilessly in the center of the room) : shine blindingly (shielding our eyes as we crossed the white sand beach that blazed and *glared*) (miles of frozen snow that *glared* in the morning sunlight) **b** *archaic* : to stand out offensively ; be unpleasantly conspicuous : OBTRUDE **2** : to stare with intense hostility, annoyance, or dislike : stare angrily or fiercely : GLOWER, SCOWL (where two armies ~ at each other across a geographical line —Lindesay Parrott) (*glared* at him as he walked in late) ~ *vt* **1** : to express (as hostility) by glowering or scowling (*glaring* defiance at each other —J.B.Priestley) **2** *archaic* : to cause to be sharply reflected SYN see BLAZE, GAZE

²glare \"\ *n -s* **1 a** (1) : a harsh uncomfortably bright light or reflection of light : intense disagreeable brightness (the unshaded bulbs threw a cheap yellow ~ over the walls —A.P. Gaskell) (the ~ of publicity); *specif* : painfully bright sunlight (the ~ on the meadows was as blinding as if it shone on tin —Jean Stafford) (2) *archaic* : the quality or state of being lustrous or glistening : SHININESS **b** : cheap showy brilliance : GARISHNESS, GAUDINESS (art was partly corrupted by the fondness for ~, expensiveness, and size —F.W.Farrar) **2** : a fixed glowering look : a look expressive of intense hostility, annoyance, or dislike : an angry or fierce stare : SCOWL (the baleful ~ of their eyes) (gave the jury a ~)

³glare \"\ *n -s* [prob. fr. *²glare*] : a surface, sheet, or glaze of glare ice

⁴glare \"\ *archaic var of* GLAIR

glare ice *n* [prob. fr. *²glare*] : ice that has a smooth slippery glassy surface (sidewalks covered with *glare ice*)

glare·less \'·ləs\ *adj* : free from glare (opaque ~ paper)

gla·re·o·la \gləˈrēələ\ *n, cap* [NL, dim. of L *glarea* gravel; prob. akin to L *granum* grain — more at CORN] : a genus (the type of the family Glareolidae) of Old World shorebirds that comprises the pratincoles which are closely related to the coursers

glar·e·ole \'gla(ə)rēˌōl\ *n -s* [NL *Glareola*] : PRATINCOLE

¹glareous *var of* GLAIREOUS

²glar·e·ous \'gla(ə)rēəs\ *adj* [L *glarea* gravel + E *-ous*] : growing in gravelly soil (~ plants)

glar·i·ness \'gla(ə)rēnəs\ *n -ES* : the quality or state of being glary (the ~ of the dusty roads)

glar·ing \'gla(ə)riŋ, -leˌ-, -reˌə\ *adj* [ME *glaringe*, fr. *glaren* to glare + *-inge, -ing* -ing] **1** : marked by a fixed look of hostility, fierceness, or anger : GLOWERING, SCOWLING (trembled at the sight of their eyes) **2 a** : shining with or reflecting a harsh uncomfortably bright light : blindingly bright (~ spotlights) (the still surface of the ~ sea) **b** (1) : showily brilliant : GARISH, GAUDY (~ colors) (2) : vulgarly ostentatious : blatantly crude (the more raffish and ~ manners of the Regency —R.E. Roberts) **3** : painfully obvious : too apparent not to be noticed : FLAGRANT (the gullibility with which we perpetuate ~ errors —Joseph O'Connor) (the self-assurance I have mentioned appears at its most ~ in a stupid man —Albert Dasnoy) : unavoidably noticeable : inescapably evident : CONSPICUOUS (the contrast between their words and their deeds today is ~ —O.M.Green) . SYN see FLAGRANT

glar·ing·ly *adv* : in a glaring manner (the need is ~ apparent)

glar·ing·ness *n -ES* : the quality or state of being glaring (embarrassed by the ~ of this error)

glary \'gla(ə)rē, -leˌ-, -reˌə\ *adj, usu -ER/-EST* [*²glare* + *-y*] : shining with or reflecting a harsh uncomfortably bright light : full of glare : GLARING (sun-scorched, ~, waterless pieces of rock —Harry Luke)

glase *obs var of* GLAZE

gla·se·ri·an fissure \gləˈzirēən-, glāˈl\ *n, usu cap G* [*glaserian* fr. Johann Heinrich *Glaser* †1675 Swiss anatomist + E *-ian*] : PETROTYMPANIC FISSURE

glas·gow \'glaˌ(ˌ)skō, -laa|, -laiˌ, -läˌ, ˌs(ˌ)gō *also* 'glazˌ(ˌ)gō *or* -läzˌ\ *adj, usu cap* [fr. *Glasgow*, city in Scotland] : of or from the city of Glasgow, Scotland (the *Glasgow* shipyards) : of the kind or style prevalent in Glasgow

glasite *usu cap, var of* GLASSITE

¹glass \'glas, -aa(ə)-,-ai-,-ä-\ *n -ES* [ME *glas*, fr. OE *glæs*; akin to OHG *glas* amber, OE *glær* amber, ON *gler* glass, OE *geolu* yellow — more at YELLOW] **1 a** : an amorphous inorganic usu. transparent or translucent substance consisting typically of a mixture of silicates or sometimes borates or phosphates formed by fusion of sand or some other form of silica or by fusion of oxides of boron or phosphorus with a flux (as soda, potash) and a stabilizer (as lime, alumina) and sometimes metallic oxides or other coloring agents so that a mass is produced that cools to a rigid condition without crystallization and that may be blown, cast, pressed, rolled, drawn, or cut into various forms — see CROWN GLASS, FIBER GLASS, FLINT GLASS; compare CULLET, FRIT **b** : any of various inorganic or organic substances resembling glass esp. in transparency, hardness, and amorphous nature (sodium phosphate ~) (organic ~*es* made from plastics) — compare ²GLAZE 2a **c** : a substance (as obsidian, pumice) produced by the quick cooling of an igneous magma **2 a** : something made wholly or almost wholly of glass: as (1) : a glass container; *esp* : a glass drinking vessel (as a tumbler or a goblet) (2) : a glass mirror : LOOKING GLASS (3) : a sheet of glass (as a windowpane, the plate-glass front of a display case, the glass covering of a picture) (4) : a shaped hollow protective glass covering (as the bell-shaped covering set over some clocks or plants, the chimney of most oil lamps) (5) : a slightly curved or flat piece of glass covering the dial of a watch or clock : CRYSTAL (6) : OPTICAL GLASS (7) : either piece of glass or other transparent material in a pair of glasses (8) : an hourglass or half-hour glass (9) : WEATHERGLASS **b** (1) : an optical instrument (as a telescope or microscope) or device that has one or more lenses and that is designed to aid in the viewing of objects otherwise wholly or partly incapable of being seen by the average eye (the captain kept his ~ fixed on the nearby shore); *specif* : BINOCULARS (stole the captain's ~*es*) (2) glasses *pl* : a device used to correct defects of vision (as nearsightedness) or to protect the eyes (as from glare, dust, flying sparks) and consisting typically of two pieces of glass designed to bend light rays or of two pieces of ordinary colored or plain glass or other transparent material that are supported by a bridge resting on the nose and by sidepieces extending over the ears (she put her ~*es* on the table) — often used with *pair* (bought a new pair of ~*es*); called also *eyeglasses, spectacles*; compare GOGGLES, PINCE-NEZ **3 a** : the quantity held by a glass container (as a drinking glass) : GLASSFUL (drank two ~*es* of water) **b** : the time required for one end of an hourglass or half-hour glass to empty (the ship had been sighted two ~*es* earlier) **4** : articles made of glass : GLASSWARE (a sparkling new set of dinner ~) : glass products (famous for the manufacture of beautiful ~) **5** *obs* : GLOSS **6** *obs* : the organ of sight : EYE

²glass \"\ *vb* -ED/-ING/-ES *vt* **1 a** (1) : to fit, set, or equip (as a window frame) with glass (only three windows had been ~*ed*) (peered in through the ~*ed* upper half of the fruitshop door —I.S.Cobb) (2) : to fit or equip with eyeglasses (had been ~*ed* at an early age) **b** : to cover or protect with glass (~*ed* the picture before framing it) : enclose, case, or wall with glass (sunlight streamed into the porch which had been ~*ed* in) **c** : to pack and seal hermetically in glass containers for preservation or transportation (~*ed* fruits) (~*ed* coffee) — compare ³CAN 1a **2 a** : to cause to have a glassy surface or

gansin, fr. It organzino, prob. fr. Urgench, town in Soviet Central Asia where it was first manufactured ... : a raw silk yarn ... from ... twisted ... doubled and twisted in the reverse direction when plied ... is used for warp threads in fine fabrics — compare TRAM

or·gasm \ˈȯ(r),gazəm\ *n* -s [NL *orgasmus*, fr. Gk *orgasmos*, fr. *organ* to grow ripe, swell, be lustful; akin to Gk *orgē* impulse, anger, OIr *ferc*, *ferg* anger, Skt *ūrj*, *ūrjā* nourishment, power, strength] **1 a** : intense or paroxysmal emotional excitement **b** : an instance or outburst of such excitement **2 a** *obs* : a condition of turgescence and physiologic excitement of a body part or organ **b (1)** : the climax of sexual excitement typically occurring toward the end of coitus; *specif* : the sudden release of tensions developed during coitus usu. accompanied in the male by ejaculation **(2)** : an instance of the occurrence of such a climax

or·gas·mic \(ˈ)ȯ(r)ˈgazmik\ *adj* **1** : like or suggestive of an orgasm **2** : tending to produce an orgasm

or·gas·tic \-astik\ *adj* [fr. *orgasm*, after such pairs as E *sarcasm*: *sarcastic*] : of, relating to, or being an orgasm

or·geat \ˈȯr,zhä\ *n* -s [F, fr. MF, fr. *orge* barley, fr. L *hordeum* — more at HORDEUM] **1** : a nonalcoholic drink prepared from the sweetened juice of almonds and other flavorings (as orange blossom essence, rose water) and usu. served cold **2** : a sweet almond-flavored nonalcoholic syrup used as a cocktail ingredient or food flavoring — called also *sirop d'orgeat*

or·gia \ˈȯ(r)jēə, -)gēə\ *n*, *pl* **orgia** *also* **orgias** [L, pl. — more at ORGY] : ORGY 1, 2

or·gi·ast \ˈȯ(r)jē,ast\ *n* -s [Gk *orgiastēs*, fr. *orgiazein* to celebrate orgies, fr. *orgia* orgies — more at ORGY] : one who celebrates orgies

or·gi·as·tic \ˌȯ(r)jēˈastik, -a(a)s,- -tēk\ *also* **or·gi·as·ti·cal** \-tə̇kəl, -tēk-\ *adj* [Gk *orgiastikos*, fr. (assumed) *orgiastos* (verbal of *orgiazein*) + -*ikos*, -ic] **1** : tending to produce wild emotion (~ music) **2** : of or having the character or quality of an orgy — **or·gi·as·ti·cal·ly** \-tə̇k(ə)lē, -tēk-, -li\ *adv*

orgn *abbr* organization

or·gone \ˈȯr,gōn\ *n* -s [prob. fr. *orgasm* + -*one* (as in *hormone*)] : a vital energy held to pervade nature and to be accumulable for use by the human body by sitting in a specially designed box

orgue \ˈȯ(ə)rg\ *n* -s [F, lit., organ, fr. L *organum* — more at ORGAN] : one of a number of long thick timbers pointed and shod with iron and formerly suspended over or in the vaulted passage behind a gateway to be let down in case of attack

or·gui·nette \ˌȯ(r)gə̇ˈnet\ *n* -s [irreg. (influence of F *orgue*) fr. ¹*organ* + -*ette*] : a small portable reed organ mechanically played by turning a crank

or·gu·lous \ˈȯ(r)g(y)ələs\ *also* **or·gil·lous** \-gəl-\ *adj* [ME *orgeilus*, *orgulous*, fr. OF *orguellieus*, *orgillleus*, fr. *orgueil*, *orguil* pride (of Gmc origin; akin to OHG *urguol* remarkable, distinguished) + -*eus* -ous] **1** : PROUD, HAUGHTY ⟨such ~ vaunting is best cured by bloodletting —E.G.Bulwer-Lytton⟩ **2** : SHOWY, SPLENDID ⟨the organ began — an ~ roll — and the academic procession passed slowly down the aisle —J.P. Bishop⟩ — **or·gu·lous·ly** *adv*

or·gy *also* **or·gie** \ˈȯrjē, ˈȯ(ə)j-, -ji\ *n*, *pl* **orgies** [MF *orgie*, fr. L *orgia*, pl., fr. Gk *orgia*; akin to Gk *ergon* work — more at WORK] **1** : secret ceremonial rites held in honor of any of various deities (as of ancient Greece) and characterized by ecstatic or frenzied singing and dancing — usu. used in pl. **2** : a ritual observance or ceremony **3** : drunken revelry : CAROUSAL **4 a** : a manifestation of excessive indulgence in some predilection ⟨an ~ of speechmaking⟩ ⟨indulge in an ~ of destruction⟩ **b** : a riotous display ⟨an ~ of pink stucco⟩

or·ham·wood \ˈȯrəm,-\ *n* [*orham* prob. modif. of F *orme* elm (fr. L *ulmus*) + E *wood* — more at ELM] : AMERICAN ELM

ori- *comb form* [MF, fr. LL, fr. L *or-*, *os* mouth — more at ORAL] **1** : mouth (*orifice*) **2** : mouth and (*orifacial*)

-oria *pl of* -ORIUM

-o·ri·al \ˌōrēəl, ˌȯr-\ *adj suffix* [ME -*oriale*, fr. L -*orius* -ory + ME -*ale* -al] : of, belonging to, or connected with (*gressorial*) (*insessorial*)

¹**orib·a·tid** \ōˈribəd·ə̇d, ˌōrəˈbad-\ *or* **orib·a·toid** \ōˈribəˌtȯid, ˌōrəˈbad-,ȯid\ *adj* [*oribatid* fr. NL *Oribatidae*; *oribatoid* fr. NL *Oribatoidea*] : of or relating to the Oribatoidea

²**oribatid** \"\ *n* -s [NL *Oribatidae*] : a mite of the superfamily Oribatoidea

ori·bat·i·dae \ˌōrəˈbad·əˌdē\ *n pl*, *cap* [NL, fr. *Oribata*, type genus + -*idae*] *in some classifications* : a family of mites coextensive with the superfamily Oribatoidea

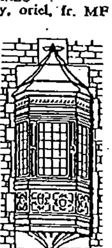
ori·ba·toi·dea \ˌōrəbəˈtȯidēə\ *n pl*, *cap* [NL, fr. *Oribata* (perh. fr. Gk *oreibatēs* mountain-ranging, fr. *oros* mountain + -*batēs*, fr. *bainein* to go) + -*oidea* — more at ORIENT, COME] : a superfamily of small oval eyeless nonparasitic mites having a heavily sclerotized integument with a leathery appearance

or·i·bi \ˈȯrəbē\ *also* **ou·re·bi** \ˈȯrə-\ *n* -s [Afrik *oribi*, prob. fr. Hottentot (Nama dial.) *arab*] : any of several small antelopes (genus *Ourebia*) of southern and eastern Africa that are tawny yellow above and white below and have straight annulated horns about five inches long

or·i·chalc *or* **or·i·chalch** \ˈȯrə,kalk\ *n* -s [L *orichalcum*, fr. Gk *oreichalkos*, lit., mountain copper, fr. *oros* mountain + *chalkos* copper — more at ORIENT, CHALC-] **1** : a yellow metallic substance considered precious by the ancient Greeks **2** : brass rich in zinc

or·i·chal·cum \ˌȯrəˈkalkəm\ *n* -s [L] : ORICHALC

ori·el \ˈōrēəl, ˈȯr-\ *n* -s [ME, porch, gallery, oriel, fr. MF *oriol* porch, gallery, prob. fr. ML *auleolum* niche, small chapel, dim. of *aula* court, hall, fr. L — more at AULA] : a large bay window of semihexagonal or semisquare plan projecting from the face of a wall and supported by a corbel or bracket



oriel

ori·en·cy \ˈōrēənsē, ˈȯr-\ *n* -ES [²*orient* + -*cy*] : the quality or state of being orient : BRILLIANCY

¹**ori·ent** \ˈōrēənt, ˈȯr-, -ē,ent\ *n* -s [ME, fr. MF, fr. L *orient-*, *oriens*, fr. pres. part. of *oriri* to rise, come forth — more at RISE] **1** *archaic* : the part of the firmament or of the world where the sun rises : EAST **1** — compare OCCIDENT **2** *usu cap* : EAST **2** ⟨sailed for the *Orient*⟩ **3** *archaic* : DAWN, SUNRISE **4 a** : a pearl of great luster **b** : the luster or sheen of a pearl **5** : a moderate to strong blue that is redder than average Prussian blue

²**orient** \"\ *adj* [ME, fr. MF, *orient*, n.] **1** *archaic* : ORIENTAL **1** **2 a** : LUSTROUS, SPARKLING ⟨~ gems⟩ **b** *archaic* : GLOWING, RADIANT ⟨with ~ colors waving —John Milton⟩ **3** *archaic* : RISING ⟨the ~ moon —P.B.Shelley⟩

³**ori·ent** \-ē,ent *sometimes when no syllable-increasing suffix follows* -ēənt\ *vt* -ED/-ING/-S [F *orienter*, fr. MF, fr. *orient*, n.] **1 a** : to cause to face or point toward the east; *specif* : to build (as a church or temple) with the longitudinal axis pointing eastward and the chief altar at the eastern end **b** : to define the position of in relation to the east **c** : to set or arrange in any determinate position in relation to the points of the compass **d** : to ascertain the bearings of ⟨determined to get some distance up the ridge above the hut, to ~ myself with the country —Elyne Mitchell⟩ **2** : to set right by adjusting to facts or principles : put into correct position or relation : acquaint with the existing situation ⟨will help freshmen to ~ themselves to college and to life —*advt*⟩ **3** : to direct toward : place in relation to ⟨~ youth to the responsibilities of military service —*Amer. Child*⟩ **4 a** : to direct to a given position in a chemical compound esp. about a nucleus ⟨the ~*ing* effect of the nitro group⟩ **b** : to ascertain the relative positions of atoms or groups in ⟨a compound⟩ **c** : to cause the axes of the molecules of (as a fiber or material) to assume the same direction ⟨~ a fiber by stretching⟩ ⟨highly ~*ed* cellulose⟩ **5** : to place (a crystal) so that its crystallographic axes lie in conventionally fixed directions **6** : to rotate (a map attached to a plane table) until the line of direction between any two of its points is parallel to the corresponding direction in nature

¹**ori·en·tal** \ˌōrēˈentᵊl, ˌȯr-\ *adj* [ME, fr. MF, fr. L *orientalis* of or belonging to the east, fr. *orient-*, *oriens* orient + -*alis* -al] **1** *often cap* : of, relating to, or situated in the Orient — compare OCCIDENTAL **2 a** : of superior grade, luster, or value — used of pearls and other precious stones; compare OCCIDENTAL **3** **b** : GLOWING **c** *sometimes cap* : being corundum or sapphire but simulating another gem in color ⟨~ amethyst⟩ ⟨~ aquamarine⟩ ⟨~ emerald⟩ **3** *often cap* : of, relating to, or having the characteristics of Orientals ⟨maintain ... an ~ politeness and a set smile which nothing can dispel or penetrate —Joseph Chiari⟩ **4** *usu cap* : of, relating to, or constituting the biogeographic realm or region that includes Asia south and southeast of the Himalayas and the Malay archipelago west of Wallace's line — **ori·en·tal·ly** \-ᵊlē, -li\ *adv*

²**oriental** \"\ *n* -s *usu cap* **1** **orientals** *pl*, *obs* : oriental languages **2** : a member of one of the indigenous peoples of the Orient (as a Chinese, Indian, or Japanese)

³**ori·en·tal** \ˌōre,enˈtäl\ *n*, *pl* **ori·en·ta·les** \-ä,läs\ *usu cap* [AmerSp, fr. Sp, adj., easterner, fr. L *orientalis*] : URUGUAYAN

oriental arborvitae *n*, *usu cap O* : an Asiatic shrub or small tree (*Thuja orientalis*) having branchlets in vertical planes — compare AMERICAN ARBORVITAE

oriental beetle *n*, *usu cap O* : a small beetle (*Anomala orientalis*) of the family Scarabaeidae now established in the U. S. and having a larva that feeds on the roots of grasses and sugar cane

oriental bezoar *n*, *usu cap O* : a bezoar composed chiefly of resinous organic matter arranged in concentric layers about a hard foreign nucleus and found in the bezoar goat or the gazelle

oriental bittersweet *n* : a vigorous European climber (*Celastrus orbiculatus*) naturalized esp. in eastern No. America and having suborbicular to broadly obovate leaves with crenate teeth

oriental blue *n* : a strong blue that is redder and darker than Sèvres and redder and duller than cerulean blue (sense 1b) — compare ORIENT BLUE

oriental bole *n* : ²BOLE 3

oriental cockroach *also* **oriental roach** *n*, *sometimes cap O* : a dark or blackish brown medium-sized cockroach (*Blatta orientalis*) prob. originating in Asia but now nearly cosmopolitan in warm and temperate areas esp. about dwellings — called also *Asiatic cockroach*, *blackbeetle*

oriental export porcelain *n*, *usu cap O* : LOWESTOFT WARE 2

oriental fruit fly *n* : a trypetid fly (*Dacus dorsalis*) that attacks many fruits, vegetables, and other plants in Hawaii, Formosa, the Philippines, and the Malay archipelago

oriental green *n* : a moderate to strong green

ori·en·ta·lia \ˌōrēən·ˈtālyə, ˌȯr-, -ē,en-, -lēə\ *n pl*, *usu cap* [NL, fr. L, neut. pl. of *orientalis* oriental — more at ORIENTAL] : materials (as literary, artistic, archaeological products and remains) relating to the Orient

ori·en·tal·ism \-ˈentᵊl,izəm\ *n* -s *often cap* **1 a** : a trait, custom, or habit of expression characteristic of oriental peoples **2** : learning in oriental subjects **3 a** : an oriental turn of thought adopted by a western thinker **b** : a characteristic of oriental art or culture appearing in western practice

ori·en·tal·ist \-ˈləst\ *n* -s *often cap* [*orientalism* + -*ist*] : a specialist in oriental subjects ⟨a very learned ~ —*Modern Language Notes*⟩

ori·en·tal·i·ty \-ən·ˈtaləd·ē, -,en-\ *n* -ES : the quality or state of being oriental

ori·en·tal·iza·tion \-,entᵊləˈzāshən, -ˌlīˈz-\ *n* -s *often cap* : the act or process of orientalizing or becoming orientalized

ori·en·tal·ize \-ˈentᵊl,īz\ *vb* -ED/-ING/-S *often cap* [¹*oriental* + -*ize*] *vt* : to make oriental : give oriental qualities or characteristics to ⟨left the West far more *Orientalized* than the East was Hellenized —Elmer Davis⟩ ~ *vi* **1** : to become oriental : adopt oriental traits or attitudes **2** : to pursue oriental studies

oriental moth *n*, *usu cap O* : an Asiatic moth (*Cnidocampa flavescens*) of the family Eucleidae now established in eastern No. America and having a larva that feeds on fruit and some shade trees

oriental mustard *n* : INDIAN MUSTARD

oriental peach moth *or* **oriental fruit moth** *n*, *sometimes cap O* : a small moth (*Grapholitha molesta*) prob. native to Japan but now of nearly cosmopolitan distribution and having a larva that is injurious to the twigs and fruit of orchard trees and esp. to the peach

oriental pearl *n* **1** : a true or natural marine pearl **2** : SLATE GRAY

oriental plane *n*, *usu cap O* : a Eurasian shade tree (*Platanus orientalis*) with broad 5- to 7-lobed leaves and globose bristly fruiting heads produced in clusters of 3 to 7

oriental poppy *n*, *usu cap O* : an Asiatic perennial poppy (*Papaver orientale*) commonly cultivated and having stiff coarse heavily haired leaves and bright scarlet, pink, orange, or salmon-colored flowers

oriental rat flea *n* : a flea (*Xenopsylla cheopis*) that is widely distributed on rodents and is a vector of plague

oriental red *n* : GOYA

oriental rice borer *n* : a crambid moth (*Chilo simplex*) with a larva that is destructive to rice in southern and eastern Asia

oriental roller *n*, *usu cap O* : a tumbler pigeon originating in Asia Minor and having a longer head and tail than ordinary tumblers

oriental rug *or* **oriental carpet** *n*, *usu cap O* : a handwoven or hand-knotted one-piece rug or carpet made in the Orient esp. in Asia and usu. having a pile produced by knotting one or several tufts of colored woolen or silk yarn around one or usu. two warps of cotton or wool with a woof shot being passed over each row

oriental sore *n*, *sometimes cap O* : leishmaniasis of the skin caused by a protozoan (*Leishmania tropica*), marked by persistent granulomatous and ulcerating lesions, and distributed widely in the Orient and in tropical regions

oriental spruce *n* : an evergreen tree (*Picea orientalis*) of the Caucasus and Asia Minor that is used as an ornamental and has pendulous branchlets with brown pubescence

oriental topaz *n* : a yellow corundum used as a gem

orientalwood \ˌ..ˈ..,.\ *or* **oriental walnut** *n*, *often cap O* : AUSTRALIAN WALNUT

ori·en·tate \ˈōrēən,tāt, ˈȯr-, -ē,en-; ˌ..ˈen,tāt; *usu* -ād.+V\ *vb* -ED/-ING/-S [F *orienter* (fr. MF) + E -*ate* — more at ORIENT] *vt* : ORIENT ⟨when they come to London, colonials ~ themselves by Piccadilly Circus —Ngaio Marsh⟩ ~ *vi* **1** : to face or turn to the east

ori·en·ta·tion \ˌ..ən·ˈtāshən *also* -,en-\ *n* -s **1 a** : the directing or placing of something so as to face the east; *esp* : the building of a church or temple on an east-west axis with the chancel and main altar to the east. **b** : the placing of a building in any determined relation to the points of the compass **2 a** : the act of determining one's bearings or settling one's sense of direction ⟨witnessed the bee's momentary pause for ~ before it headed back to the hive⟩ **b** : the settling of a sense of direction or relationship in moral or social concerns or in thought or art ⟨reflection conducive to the individual's intellectual and spiritual ~ —*College English*⟩ ⟨America has quite a different ~ toward new music —Ernst Krenek⟩ **3** : choice or adjustment of associations, connections, or dispositions ⟨development toward a money ~ —W.E.Moore⟩ ⟨nations widely different in their political ~ —J.G.Colton⟩ **4** : introduction to an unfamiliar situation : guidance in experience or activity of a new kind ⟨the ~ program set up for the benefit of new employees —*Dun's Rev.*⟩ **5** : the change of position exhibited by some protoplasmic bodies within the cell in relation to external influences (as light or heat) or in relation to one another **6 a** : the relative positions of atoms or groups in a chemical compound esp. about a nucleus **b** : the determination of such positions — compare ³ORIENT 4 **7** *psychiatry* : awareness of the existing situation with reference to time, place, and identity of persons — **ori·en·ta·tion·al** \ˌ..(ˌ)..ˈtāshən(ə)l, -shnəl\ *adj*

ori·en·ta·tor \-ād·ə(r), -ātə-\ *n* -s : an apparatus in which a man seated in a partly enclosed box or cage can be subjected to the motions and stresses experienced by an airplane pilot in flight

orient blue *n* **1** : a grayish blue that is redder and paler than electric, greener than copenhagen, and redder, lighter, and stronger than Gobelin — compare ORIENTAL BLUE **2** : ORIENT 5

oriente ... of ... (this ... oriente ... identified throughout ... associates itself with these ... recent tendencies to seek a common human ethics which ... be valid for all mankind —Cornelius Krusé) **2** : h... psychological orientation ⟨on the fourth day she was alert and ~ —Milton Rosenbaum⟩

ori·ent·er *or* **ori·en·tor** \ˈ..,entə(r)\ *n* -s : one who assists a newcomer in adjusting to a social situation or to the local routine

orienting *pres part of* ORIENT

ori·en·tite \ˌ..ˈen,tīt; ˈ..ən-,tīt, -,en-\ *n* -s [*Oriente*, province in eastern Cuba, its locality, + E -*ite*] : a mineral $Ca_4Mn_4Si_5O_{20}.4H_2O$ consisting of a hydrous calcium manganese silicate occurring in small brown orthorhombic crystals (hardness 4.5-5, sp. gr. 3)

orientiy *adv*, *obs* : in an orient manner : CLEARLY, LUSTROUSLY

orientness *n* -ES *obs* : the quality or state of being orient : BRILLIANCY

orient pink *n* : a moderate yellowish pink that is yellower and paler than coral pink and yellower and less strong than peach pink

orient red *n* : GOYA

orients *pl of* ORIENT, *pres 3d sing of* ORIENT

orient yellow *n* : CADMIUM YELLOW 2

-ories *pl of* -ORY

or·i·fice \ˈȯrəfə̇s, ˈär-\ *n* -s [MF, fr. LL *orificium*, fr. L *or-*, *os* mouth + -*ficium* (fr. -*ficus* -fic) — more at ORAL] : the mouth or opening of something : APERTURE, HOLE, VENT ⟨was obviously the ~ of entrance, because its edges were torn and lacerated —Basil Thomson⟩ — see CLAM illustration

orifice box *n* : a stilling basin under the inlet to a reservoir

orifice plate *n* : a disk containing a calibrated circular hole bolted between two abutting pipe flanges to regulate flow

or·i·fi·cial \ˌ..ˈfishəl\ *adj* : of or relating to an orifice

or·i·flamme \ˈȯrə,flam, ˈär-, -laa(ə)m\ *n* -s [ME *oriflamble*, fr. MF *oriflamble*, *orieflambe*, fr. OF, fr. ML *aurea flamma*, lit., golden flame, fr. L *aurea*, fem. of *aureus* golden (fr. *aurum* gold) + *flamma* flame — more at ORIOLE, FLAME] : a banner inspiring lively devotion or courage : a bright or glorious ensign or symbol ⟨that gallant and chivalrous spirit that has streamed like an ~ through the storms of centuries —J.L.Lowes⟩

orig *abbr* origin; original; originally

ori·ga·mi \ˌȯrəˈgämē\ *n* -s [Jap] **1** : the art or process of Japanese paper folding **2** : something (as a representation of a bird, insect, flower) made by origami

or·i·gan \ˈȯrəgən\ *also* **or·i·gane** \-,gan, -,gān\ *n* -s [ME *origane*, fr. MF *origan*, *origane* wild marjoram, fr. L *origanum*] : any of various aromatic mints (as wild marjoram)

¹**orig·a·num** \əˈrigənəm, ōˈ-\ *or* **oreg·a·no** \əˈregə,nō, ōˈ-\ *n* -s [*origanum* fr. ME, fr. L, wild marjoram, fr. Gk *origanon*; *oregano* fr. Sp *orégano*, fr. L *origanum*] : any of various fragrant aromatic plants of the families Labiatae and Verbenaceae that are used as seasonings in cookery; *usu* : WILD MARJORAM

²**origanum** \"\ *n*, *cap* [NL, fr. L, wild marjoram] : a genus of Eurasian aromatic mints having small erect spikes of flowers arranged in panicles or corymbs and the calyx almost equally 5-toothed — see CRETAN DITTANY, WILD MARJORAM; compare MAJORANA

origanum oil *n* **1** : an essential oil obtained from various herbs of the genus *Origanum* formerly used in medicine and perfumery **2** : THYME OIL

¹**or·i·gen·i·an** \ˌȯrəˈjēnēən, ˌär-, -jen-\ *adj*, *usu cap* [*Origen* †A.D. 254? Christian writer, teacher, and theologian + E -*an*] : of, relating to, or attributed to Origen

²**origenian** \"\ *n* -s *usu cap* : an adherent or follower of Origen

or·i·gen·ic \-ˈjenik\ *adj*, *usu cap* [*Origen* †A.D. 254? Christian writer, teacher and theologian + E -*ic*] : ORIGENIAN

or·i·gen·ism \ˈ.. jə,nizəm, -je,n-\ *n* -s *usu cap* [*Origen* †A.D. 254? + E -*ism*] : the doctrines held by or attributed to the 3d century Christian theologian Origen who sought to work out a complete Christian philosophy based on the Scriptures and developed largely along Platonic lines

¹**or·i·gen·ist** \-nəst\ *n* -s *usu cap* [LL *origenistes*, fr. *Origen* †A.D. 254? Christian writer, teacher and theologian + L -*istes* -ist] : an advocate of Origenism

²**origenist** \"\ *or* **or·i·gen·is·tic** \ˌ..(ˌ)..ˈnistik\ *adj*, *usu cap* [*origenism* + -*ist* or -*istic*] : of or relating to Origen or Origenism

or·i·gin \ˈȯrəjə̇n, ˈär-\ *n* -s [ME *origine*, prob. fr. MF, fr. L *origin-*, *origo*, fr. *oriri* to rise, come forth — more at ORIENT] **1** : ANCESTRY, PARENTAGE ⟨was of humble ~⟩ **2 a** : rise, beginning, or derivation from a source ⟨had its ~ ... when a tramp printer established it as a weekly —*Amer. Guide Series: Pa.*⟩ **b** : primary source or cause : FOUNTAIN, SPRING ⟨a letter found on his clothes tells us the ~ of the quarrel —George Meredith⟩ **3** : the more fixed, central, or larger attachment or part of a muscle — compare INSERTION **4 a** : the intersection of the axes of Cartesian coordinates **b** : any arbitrary zero from which a magnitude is reckoned

SYN SOURCE, INCEPTION, ROOT, PROVENANCE, PROVENIENCE, PRIME MOVER: ORIGIN applies to a person, situation, or condition that marks the beginning of a course or development, to the point at which something rises or starts, or, sometimes, to effective causes ⟨it is probable that the *origin* of language is not a problem that can be solved out of the resources of linguistics alone —Edward Sapir⟩ ⟨the exact *origin* of the pain is not definitely known since it might reasonably be expected to appear in any unyielding tissue or it could arise from distention of the joint cavity itself —H.G.Armstrong⟩ ⟨found the *origin* of faith in an undifferentiated feeling of the Infinite and Eternal —W.R.Inge⟩ SOURCE, often interchangeable with ORIGIN, may center attention on a point of ultimate beginning whence something rises, flows, or emanates ⟨this mystery and meaning of freedom, sin, and grace are the perennial *sources* of the religious life —Reinhold Niebuhr⟩ ⟨the *source* of infection was traced to the feeding to hogs of raw garbage from ships from the Orient —*Americana Annual*⟩ ⟨the probable *sources* of civilization, roughly the three great river valleys of the Nile, the Tigris and Euphrates, and the Indus —R.W.Murray⟩ INCEPTION stresses the notion of an initiating, starting, or beginning point without implication about causes ⟨joining the group at its *inception*⟩ ⟨tin miners, who had to bring coal from south Wales, used the Watt engine from the time of its *inception* —S.F.Mason⟩ ⟨has taken part in the United States atomic energy program since its *inception* in 1942 —*Current Biog.*⟩ ROOT may suggest a first, ultimate, or fundamental source, often one not patently evident ⟨several of the large foundations . . . have been spending hundreds of thousands of dollars to get at the *root* of the trouble —J.M.Barzun⟩ PROVENANCE and PROVENIENCE designate the area, sphere, or group in which something has originated or from which it is derived ⟨any layman who is sufficiently interested in the cheese he eats to inquire about its *provenance* must have noticed how much a monastery background improves a cheese —*New Yorker*⟩ ⟨relatively recent words of scientific *provenance*, e.g., appendicitis, iodine, quinine, and so on —H.L.Mencken⟩ ⟨the African *provenience* of northern Negroes —M.J.Herskovits⟩ PRIME MOVER may refer to an ultimate and original source of motive power that sets a thing moving; of personal agents it may refer to an inciter or instigator ⟨wind as the *prime mover* in impelling a sailing ship⟩ ⟨a committee on general education, in the organization of which your headmaster was a *prime mover* —A.W.Griswold⟩ ⟨evidence was also obtained implicating Heath as the *prime mover* in the affair and immediately upon Daniel's return the former was arrested —D.D.Martin⟩

¹**orig·i·nal** \əˈrijənᵊl, -jnəl\ *n* -s [ME, fr. MF, fr. ML *originale*, fr. L *originale*, adj., original, neut. of *originalis*] **1** *archaic* **a** : the source or cause from which something arises **b** : PARENTAGE **c** : AUTHOR, ORIGINATOR **2** *archaic* : ORIGIN **2** **3 a** : a model, pattern, or archetype that is copied **b (1)** : a primary manuscript from which copies are made **(2)** : a direct impression produced by a typewriter esp. when made simultaneously with one or more carbon copies **c (1)** : the person or thing represented in a photograph or an artist's work **(2)** : a picture or work of art from which copies are made **4** : a work composed firsthand : an artist's independent or spontaneous product ⟨caught up on their mail or . . .

outturn \'-ˌ-\ *n* [*out* + *turn* (after *turn out*, v.)] **1 a** : an amount of something (as of a crop or manufactured item) turned out or produced : OUTPUT, YIELD ⟨the cotton ~ and the corn crop . . . and extensive new irrigation works multiplied the ~ —J.S.Furnivall⟩ **b** : a sampling taken at a paper mill from each run on a paper machine **2 a** : the quality or condition of something turned out or produced ⟨oiling of eggs has resulted in greatly improved ~ in the export pack and winter cold storage —*Poultry Farmer (Australia)*⟩ **b** : the condition in which a shipment arrives at its destination ⟨inaugurated special methods of stowing turpentine barrels, in ships bound on long voyages, in order to assure better ~s —*Chem. Markets*⟩

out-turn \'-ˌ-\ *n* [*out* + *turn* (after *turn out*, v.)] : a moving curling stone which is rotating counterclockwise — compare IN-TURN

outvalue \(ˌ)au̇tˈ-ˌ-\ *vt* [*out-* + *value*] : to be worth more than ⟨the talk ~s many a novel —Thomas Wood †1950⟩

outvie \(ˌ)au̇tˈ-\ *vt* [*out-* + *vie*] : to surpass in a rivalry or competition ⟨*outvying* each other in courtesy⟩

outvote \(ˌ)au̇tˈ-\ *vt* [*out-* + *vote*] **1** : to cast more votes than : defeat by a majority of votes ⟨these two groups can combine to ~ the other members of the board⟩ ⟨the outstate districts can ~ the city⟩ **2** : to defeat in a contest or on an issue decided by votes ⟨the cabinet must resign if it is *outvoted* —John Gunther⟩

outwait \(ˌ)au̇tˈ-\ *vt* [*out-* + *wait*] : to remain waiting longer than

outwake \(ˌ)au̇tˈ-\ *vt* [*out-* + *wake*] : to remain awake longer than : OUTWATCH

out-wale \ˈau̇tˌwāl\ *n* [*out* + *gunwale*] : the outside piece of a gunwale (as of a canoe)

outwalk \(ˌ)au̇tˈ-\ *vt* [*out-* + *walk*] **1** : to outdo in walking ⟨could ~ those not nearly so old as he was —John Mason Brown⟩ **2** : to walk past or beyond ⟨~*ed* the furthest city light —Robert Frost⟩

outwall \ˈau̇tˌ-\ *n* [*out* + *wall*] **1** *archaic* : an outer wall or other enclosure **2** *obs* : the outer enclosure of a human being (as clothing or the body) ⟨I am much more than my ~—Shak.⟩

outwander \(ˌ)au̇tˈ-\ *vi* [*out* + *wander*] : to wander out or away ⟨there is little ~*ing* or outgrowth from the tissues —*Science*⟩

¹out-ward \ˈau̇twə(r)d\ *adj* [ME, fr. OE *ūtanweard*, *ūteweard*, *ūtweard*, fr. *ūtan* outside, from outside (fr. *ūt* out), *ūte* out, outside (fr. *ūt* out), & *ūt* out + *-weard* -ward — more at OUT] **1 a** : moving, directed, or turned toward the outside or away from a center ⟨the inward or ~ flow of money —*Jour. of Accountancy*⟩ ⟨the gradual ~ slope of the spur ridges —C.B. Hitchcock⟩ ⟨an ~ journey⟩ **b** : of or relating to a movement toward the outside ⟨the cost of returning a parcel includes postage, generally equivalent to the ~ charge —*Great Britain Post Office Guide*⟩ **2** : situated or lying on the outside of an enclosure or surface : EXTERIOR ⟨found the place where I was to lie . . . close and confined . . . and therefore lay all night in an ~ room —Tobias Smollett⟩ **3** : of or relating to the body and its surface appearance and clothing as opposed to the mind or spirit : BODILY, EXTERNAL ⟨~ man⟩ ⟨~ beauty⟩ ⟨~ form⟩ **4 a** : of or relating to an external act, activity, happening, or condition as distinguished from a mental or emotional process ⟨the chief ~ events of his life⟩ ⟨the new job represented a great improvement in his ~ status⟩ ⟨a feverish ~ display of energy⟩ **b** : of or relating to material objects as opposed to ideal concepts ⟨we alone wore ~ shackles —Mary Johnston⟩ **c** : of or relating to form as distinguished from essence ⟨began to find a recognized place in the ~ pattern of church life —*Eastern Churches Quarterly*⟩ **5** *dial Eng* : inclined to drink : DISSIPATED SYN see OUTER

²outward \ˈ-\ *or* **out-wards** \-dz\ *adv* [*outward* fr. ME, fr. OE *ūtanweard*, *ūteweard*, *ūtweard*, fr. *ūtanweard*, *ūteweard*, *ūtweard*, adj.; *outwards* fr. ME *outwardes*, fr. OE *ūteweardes*, fr. *ūtweard*, adj. & adv. + *-es* -s] **1 a** : toward the outside : away from a center or starting point ⟨the eternally ~ moving stars —*N.Y. Times*⟩ ⟨the city stretches ~ for many miles⟩ **b** : from the soul or mind toward external manifestation **2** *obs* : on the outside : EXTERNALLY ⟨they have a good cover, they show well ~ —Shak.⟩

³out-ward \ˈau̇twə(r)d\ *n* -s [*¹outward*] **1** : external form or appearance : OUTSIDE ⟨so fair an ~ and such stuff within —Shak.⟩ **2** : the material world ⟨can perceive the ~ and the inward, nature's good and God's —Robert Browning⟩

outward-bound \ˌ-ˈ-ˌ\ *adj* : bound in an outward direction or to foreign parts ⟨an *outward-bound* ship⟩ — **outward-bound-er** \-ə(r)\ *n*

outward-flow turbine \ˈ-ˌ-\ *n* : a water turbine in which the discharge stage of flow is away from the axis

out-ward-ly *adv* [ME, fr. *outward*, adj. + *-ly*] **1 a** : on the outside : EXTERNALLY ⟨~ visible⟩ ⟨~ apparent⟩ **b** : toward the outside : in an outward direction ⟨we see ~ and represent the apparent nature of things —Herbert Read⟩ **2** : in outward state, behavior, or appearance ⟨his ~ more fortunate fellows —Kenneth Fearing⟩ ⟨~ diffident, inwardly dreamy —Jean S. Untermeyer⟩ ⟨~ a placid island —Patrick Smith⟩

out-ward-ness *n* -ES **1** : the quality or state of being outward : EXTERNALITY ⟨the ~ of the world⟩ **2** : concern with or responsiveness to outward things ⟨hearty showmanship and all-around ~ —F.H.Gervasi⟩

outwash \ˈau̇tˌ-\ *n, often attrib* [*out* + *wash* (after *wash out*, v.)] **1 a** : detritus chiefly consisting of gravel and sand carried by running water from the melting ice of a glacier and laid down in stratified deposits : glaciofluvial drift **b** : meltwater from a glacier **2** : soil material washed down a hillside by rainwater and spread upon the more gently sloping adjacent land

outwash cone *or* **outwash fan** *n* : a cone-shaped or fanlike mass of outwash that is ordinarily found at the margin of a dwindling glacier or shrinking ice sheet

outwash plain *also* **outwash apron** *n* : a plain constructed of outwash that is ordinarily found on and beyond the distal side of a terminal or recessional moraine and that generally consists of a number of coalescing outwash fans

outwash train *n* : VALLEY TRAIN

outwatch \(ˌ)au̇tˈ-\ *vt* [*out-* + *watch*] **1** : to surpass in watching : maintain a longer vigil than ⟨~ his companions⟩ **2** : to maintain a vigil till after the disappearance or end of ⟨~ the moon⟩ ⟨~ the night⟩

outwear \(ˌ)au̇tˈ-\ *vt* [*out* + *wear*] **1** : to wear out or use up : consume or destroy by attrition or use : EXHAUST ⟨drops of water ~ stone⟩ ⟨the machinery has been *outworn*⟩ ⟨the rowers were *outworn*⟩ **2 a** [*out-* + *wear*] : to last longer in use than ⟨a fiber that ~*s* others⟩ **b** : to grow or develop beyond in course of time : OUTGROW, OUTLIVE ⟨in cases where tradition is notoriously *outworn* —W.C.Brownell⟩ **3** *archaic* : to take up the time of ⟨with sick longing all the night ~ —John Keats⟩

outweep \(ˌ)au̇tˈ-\ *vt* [*out* + *weep*] **1** *archaic* : to weep out ⟨like a cloud which had *outwept* its rain —P.B.Shelley⟩ **2** [*out-* + *weep*] : to surpass in weeping ⟨can ~ any woman⟩

outweigh \(ˌ)au̇tˈ-\ *vt* [*out-* + *weigh*] : to exceed in weight, value, or importance ⟨an ounce of custom ~*s* a ton of reason —William Hamilton †1856⟩ ⟨no dangers could ~ the advantages of steamboat transportation —*Amer. Guide Series: Ark.*⟩

outwell \(ˌ)au̇tˈ-\ *vb* [*out* + *well*] *vt, obs* : to pour out ~ *vi* : to well out

outwent *past of* OUTGO

¹outwick \ˈ-ˌ-\ *n* [*out* + *wick*] : a shot in curling in which a player's stone is made to hit the outer edge of another stone so as to drive the latter toward the tee — compare INWICK

²outwick \ˈ-\ *vi* : to make an outwick

¹outwind \ˈ-ˌ-\ *n* [*out* + *wind*] : a wind from the sea

²outwind \(ˌ)au̇tˈ-\ *vt* [*out* + *wind*] : to put out of breath ⟨an ~ed runner⟩

outwing \(ˌ)au̇tˈ-\ *vt* [*out-* + *wing*] **1** : to outstrip or pass in flying **2** : OUTFLANK

outwinter \(ˌ)au̇tˈ-\ *vb* [*out* + *winter*] *vt* : to keep (cattle) outdoors in winter ⟨the cost of feeding ~*ed* cattle —T.H. Jackson⟩ ~ *vi* : to stay outdoors in winter ⟨the Jersey can ~ provided the climate is not very damp —F.D.Smith & Barbara Wilcox⟩

outwit \(ˌ)au̇tˈ-\ *vt* [*out-* + *wit*] **1** : to defeat or get the better of by superior cleverness or ingenuity : OVERREACH ⟨how best to ~ the youngster and set him to learning when he is not fully aware of it —G.N.Shuster⟩ ⟨three men caught *outwitting* an automatic pinball machine with counterfeit slugs —*Phoenix Sun*⟩ **2** *archaic* : to surpass in wisdom ⟨outsee seers and outwore *past of* OUTWEAR

¹outwork \(ˌ)au̇tˈ-\ *vt* [*out* + *work*] **1** : to work out : COMPLETE ⟨saw, in web unbroken, its history *outwrought* —Thomas Hardy⟩ **2** [*out-* + *work*] *archaic* : to surpass in workmanship **3** [*out-* + *work*] : to outdo in working : work harder or faster than ⟨~s his competitors⟩

²outwork \ˈ-ˌ-\ *n* [*out* + *work*] **1 a** : an outlying point of defense ⟨had been forced to abandon her ~s across the Rhine and the Danube —Richard Koebner⟩ ⟨impairs not only the ~s but the citadel of personality —Walter Moberly⟩ **b** : a small defensive position constructed outside a fortified area **2** : work done outside the shop or institution from which it is directed or for which it is performed

outworker \ˈ-ˌ-\ *n* [*out* + *worker*] : one that works outside the institution or shop by which he is employed

outworld \ˈ-ˌ-\ *n* [*out* + *world*] : the outside world

outworn \ˈ-ˌ-\ *adj* [fr. past part. of *outwear*] **1** : no longer useful or accepted : OUTMODED, OBSOLETE ⟨still attempted to cling to the ~ ethics professed at the dawning of the Gilded Age —J.D.Hart⟩ ⟨an ~ road⟩ **2** : worn out : used up : EXHAUSTED ⟨an ~ champion pugilist —Stanley Walker⟩

outwrestle \(ˌ)au̇tˈ-\ *vt* [*out-* + *wrestle*] : to defeat in wrestling : grapple with successfully

outwrite \(ˌ)au̇tˈ-\ *vt* [*out-* + *write*] **1** : to surpass in ability to write ⟨historian for historian, journalist for journalist, they ~ us —R.H.Rovece⟩ **2** [*out* + *write*] : to throw off or overcome by writing ⟨*outwrote* his depression⟩

outwrought *past of* OUTWORK

outyell \(ˌ)au̇tˈ-\ *vt* [*out-* + *yell*] : to yell louder than ⟨women quarreling and trying to ~ each other —H.L.Davis⟩

outyield \(ˌ)au̇tˈ-\ *vt* [*out-* + *yield*] : to surpass in yield ⟨fall-sown or winter oats matured earlier and ~*ed* spring oats —*Experiment Station Record*⟩

ouvarovite *var of* UVAROVITE

ou-vert \(ˌ)üˈvе(ə)r\ *adj* [F, lit., open, fr. OF *overt* — more at OVERT] **1** *ballet* : having an open stance or movement **2** *card games* : OPEN 17b(2)

ou-zel *also* **ou-sel** \ˈüzəl\ *n* -s [ME *ousel*, *osel*, fr. OE *ōsle* — more at MERL] **1** : a European blackbird (*Turdus merula*) **2** : any of various thrushes or other birds that are related to the ouzel — see RING OUZEL, WATER OUZEL

ou-zo \ˈü(ˌ)zō\ *n* -S [NGk *ouzon*] : a colorless anise-flavored unsweetened Greek liqueur that turns milk-white when mixed with water and ice

ov- *or* **ovi-** *or* **ovo-** *comb form* [L *ov-*, *ovi-*, fr. *ovum* — more at EGG] **1 a** : egg ⟨oviject⟩ ⟨oviform⟩ ⟨ovomucoid⟩ **b** : ovum ⟨ovocyte⟩ ⟨ovogenesis⟩ **2** : ovally ⟨ovo-elliptic⟩

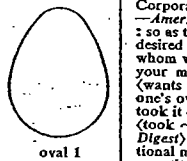
ov *abbr* ovum

OV *abbr* **1** oil of vitriol **2** over voltage

ova *pl of* OVUM

¹oval \ˈōvəl\ *adj* [ML *ovalis*, fr. LL, of an egg, fr. L *ovum* egg + *-alis* -al] : having the shape of an oval : broadly elliptical ⟨an ~ ball⟩ — often used in combination ⟨an *oval*-faced child⟩ — **oval-ly** \-vəl(l)ē, -i\ *adv*

²oval \ˈ\ *n* -S **1** : a body or figure generally in the shape of the longitudinal section of an egg **2** : an object of oval or ellipsoidal shape: as **a** : a cartouche of an Egyptian king **b** (1) : a stadium, arena, or athletic field of oval shape (2) : RUNNING TRACK, RACETRACK


oval 1

³oval \ˈ\ *vb* **ovaled** *or* **ovalled**; **ovaled** *or* **ovalled**; **ovaling** \-v(ə)liŋ\ *or* **ovalling**; **ovals** *vi* : to make oval ~ *vt* : to become oval

ov-albumin \(ˌ)ōvˈ+\ *n* [*ov-* + *albumin*] **1** : the principal albumin of white of egg; *esp* : the crystalline part of egg albumins — compare CONALBUMIN **2** : EGG ALBUMIN

ova-le \ō'välē\ *adj* [NL, specific epithet of *Plasmodium ovale*, fr. ML *ovale*, neut. of *ovalis* oval] : of, relating to, or caused by a malarial parasite (*Plasmodium ovale*)

oval-i-ty \ōˈvaləd-ē\ *n* -ES [ISV *¹oval* + *-ity*] : the quality or state of being oval in shape : degree of departure from true circularity ⟨~ of a worn gun bore⟩

oval-ness \ˈōvalnəs\ *n* -ES : OVALITY

ovalo-cyte \ōˈvalə,sīt, ˈōvalō,s-\ *n* -S [ISV *¹oval* + *-o-* + *-cyte*] : an oval red blood cell normal in the camel and occurring as a rare hereditary anomaly in man — **ovalo-cyt-ic** \ˌ-ˈsid-ik, ˌ-ˈsīt-\ *adj*

ovalo-cy-to-sis \ˌ-ˌsīˈtōsəs, -ˌsī(ˌ)ō-\ *n, pl* **ovalocyto-ses** \-ˌsēz\ [NL, fr. ISV *ovalocyte* + NL *-osis*] : a hereditary trait in man manifested by the presence in the blood of red blood cells which are oval in shape with rounded ends — compare SICKLE-CELL TRAIT

oval-old \ˈōvəˌlȯid\ *adj* [*¹oval* + *-oid*] : approximately oval

oval window *n* [trans. of NL *fenestra ovalis*] : the oval fenestra of the ear

ovari- *or* **ovario-** *also* **ovar-** *comb form* [NL, fr. *ovarium*] **1** : ovary (*ovaritis*) ⟨*ovariectomy*⟩ ⟨*ovariotomy*⟩ **2** : ovarian and ⟨*ovario*-abdominal⟩

ovar-i-al \(ˌ)ōˈva(ə)rēəl, -vər-ˌ-vār-\ *adj* [prob. fr. (assumed) NL *ovarialis*, fr. NL *ovari-* + L *-alis* -al] : of, involving, or affecting an ovary ⟨~ function⟩ ⟨~ poisons⟩

ovari-an \-ēən\ *adj* [prob. fr. (assumed) NL *ovarianus*, fr. NL *ovari-* + L *-anus* -an] : of or relating to an ovary

ovari-ec-to-mize \(ˌ)ōˌva(ə)rēˈektəˌmīz, ˌōvər-\ *vt* -ED/-ING/-S [*ovariectomy* + *-ize*] : to remove an ovary surgically from

ovari-ec-to-my \-mē\ *n* -ES [NL *ovariectomia*, fr. *ovari-* + *-ectomia* -ectomy] : the surgical removal of an ovary

ovar-i-ole \ōˈva(ə)rēˌōl\ *n* -S [*ovari-* + *-ole*] : one of the tubes of which the ovaries of most insects are composed

ovar-i-o-testis \ōˌva(ə)rēō-\ *n* [NL, fr. *ovari-* + L *testis*] : OVOTESTIS

ovar-i-ot-o-my \(ˌ)ōˌva(ə)rēˈäd-əmē\ *n* -ES [NL *ovariotomia*, fr. *ovari-* + *-tomia* -tomy] **1** : surgical incision of an ovary **2** : OVARIECTOMY

ova-ri-tis \ˌōvəˈrīd-əs\ *n, pl* **ova-rit-i-des** \-rid-ə,dēz\ [NL, fr. *ovari-* + *-itis*] : inflammation of an ovary : OOPHORITIS

ovar-i-um \ōˈva(ə)rēəm\ *n, pl* **ovar-ia** \-ēə\ [NL] *archaic* : OVARY

ova-ry \ˈōv(ə)rē, -rī\ *n* -ES [NL *ovarium*, fr. L *ovum* egg + *-arium* -ary — more at EGG] **1** : the typically paired essential female reproductive organ that produces eggs and in vertebrates female sex hormones, that occurs in the adult human as an oval flattened body about one inch and one half long suspended from the dorsal surface of the broad ligament of either side, that arises from the Wolffian body, and that consists of a vascular fibrous stroma enclosing developing egg cells which in their later stages with nutricial structures constitute Graafian follicles **2** : the enlarged rounded usu. basal portion of the pistil or gynoecium of an angiospermous plant that bears the ovules and consists of a single carpel or of several united carpels — see FLOWER illustration

¹ovate \ˈōˌvāt, ˈāvət\ *n* -S [modif. of Gk *ouatēs*, pl., members of one of three classes of Gaulish bards, prob. of Celt origin; akin to OIr *fáith* seer, poet — more at VATIC] : one of a class of bards in Wales graduated in bardic lore and approved by a session of bards

²ovate \ˈōˌvāt, *usu* -ād-+V\ *adj* [L *ovatus*, fr. *ovum* egg + *-atus* -ate] **1** : shaped like an egg : OVAL — often used in combination ⟨*ovate*-oblong⟩ ⟨*ovate*-deltoid⟩ **2** : having an outline like that of the longitudinal section of an egg with the basal end broader (~ leaves) — see LEAF illustration

ova-tion \ōˈvāshən\ *n* -S [L *ovation-*, *ovatio*, fr. *ovatus* (past part. of *ovare* to exult, rejoice) + *-ion-*, *-io* -ion; akin to Gk *euazein* to shout for joy, *ewoi*, interjection used in Dionysiac celebrations] **1** : a ceremony attending the entering of Rome by a general who had won a victory of less importance than that for which a triumph was granted *archaic* : EXULTATION **3** : enthusiastic popular homage or a public expression of it : an enthusiastic popular reception or tribute ⟨received an ~ as he entered the hall⟩

²ovation \ˈ\ *vt* -ED/-ING/-S : to give an ovation ⟨will all be there . . . to ~ you —Barnaby Conrad⟩

ova-tion-al \-shnəl, -shən-\ *adj* : of or relating to an ovation

ovc *abbr* ovicell

ov-ejec-tor \ˈōvəˌjektə(r), -vē,j-\ *n* -S [ISV *ov-* + *ejector*, fr. *eject* + *-or*] : the terminal highly mus[illegible] part of the oviduct of many nematode worms that forces the egg through the genital pore — **ovejectoral** *adj*

ov-en \ˈəvən *sometimes* ˈōvˈm *or* ˈəbˈm\ *n* -S [ME, fr. OE *ofen*; akin to OHG *ofan* oven, ON *ofn*, Goth *aubns* oven, L *aulla* pot, Gk *lpnos* oven, Skt *ukhā* cooking pot] **1** *obs* : FURNACE **2 a** : a chamber of brick or stoneware used for baking, heating, or drying **b** : a heated enclosure of varying construction used for such purposes: as (1) : a chamber in a stove used for baking or roasting (2) : a laboratory hot-air sterilizer

ovenbird \ˈ-ˌ-\ *n* [*oven* + *bird*; fr. the shape of their nests] **1** : any of various So. American passerine birds of the genus *Furnarius* **2** : an American warbler (*Seiurus aurocapillus*) having olivaceous upper parts with a yellowish brown black-bordered crown, white underparts streaked with black and building a dome-shaped nest placed on the ground

oven dressed *adj* : ready for cooking : FULL-DRESSED ⟨*oven dressed* poultry⟩

ovendry \ˈ-ˌ-\ *adj* [*oven* + *dry*, adj.] : dried at a temperature at or above that of boiling water (usu. 100 to 110°C or 212 to 230°F)

oven-dry \ˈ-ˌ-\ *vt* [*oven* + *dry*, v.] : to dry in an oven

ovenman \ˈ-ˌman\ *n, pl* **ovenmen** **1** : a baker who tends an oven **2** : a worker who bakes parts or products in an oven to harden and strengthen them or to harden their finish

ovenware \ˈ-ˌe\ *n* : dishes used for baking and serving food

oven wood *n* : BRUSHWOOD

¹over \ˈōvə(r)\ *adv* [ME, adv. & prep., fr. OE *ofer*; akin to OHG *ubari*, *ubiri*, adv., over, *ubar*, prep., over, ON *yfir*, adv. & prep., Goth *ufar*, prep., over, L *super*, adv. & prep., over, Gk *hyper*, adv. & prep., Skt *upari*, adv. & prep., over, OE *ufan* above] **1 a** (1) : from one point to another across an intervening space or barrier ⟨sail ~ to England⟩ ⟨throw the ball ~⟩ ⟨galloped ~ to the scene —H.E.Scudder⟩ ⟨the major called the three ~ —C. G. De Van⟩ (2) : so as to pass down or forward and down ⟨went too near the edge and fell ~⟩ (3) : from inside to outside across the brim ⟨the soup boiled ~⟩ (4) : so as to bring the underside to or toward the top ⟨turned himself ~⟩ ⟨roll a stone ~⟩ ⟨turn the page ~⟩ (5) : in the opposite direction ⟨gave the order to put the helm ~ —A. A. & Mary Hoehling⟩ (6) : over the side of a ship ⟨put a boat ~ to come and look for you —R.F.Mitchell⟩ ⟨put the ladder ~ — Vincent McHugh⟩ (7) : from side to side : in diameter : ACROSS ⟨the mouth of the cave was about 12 feet ~⟩ (8) : so as to pass over a target and beyond ⟨the bullets fell short or went ~⟩ (9) : away from a vertical to a prone or inclined position ⟨knocked the boy ~⟩ ⟨the wall fell ~⟩ ⟨the ship heeled ~⟩ (10) : to one's home ⟨inviting fifteen or twenty of her friends ~ for fun and games —*N.Y.Times*⟩ **b** (1) : on the other side of an intervening space ⟨is ~ in England⟩ (2) : at some distance from a particular point : AWAY ⟨a fellow a couple of counties ~ —Brad Sebstad⟩ ⟨from two blocks ~ he could hear the thin wail —H.M.Brier⟩ ⟨the bomb hit the next pier ~ —R.O.Bowen⟩ **c** (1) : so as to pass or transfer from one person, side, activity, or opinion to another ⟨hand ~ the money⟩ ⟨theater orchestras . . . had gone ~ completely to it —*Amer. Guide Series: Wash.*⟩ ⟨endorsed it ~ to the . . . Housing Corporation —Warner Olivier⟩ ⟨turned it ~ to her daughter —*Amer. Guide Series: Ark.*⟩ ⟨went ~ to the opposition⟩ (2) : so as to achieve understanding, acceptance, support, or other desired effect — usu. used with *get* ⟨are not getting ~ to those whom we are addressing —A.T.Weaver⟩ ⟨get your effect and your meaning ~ to the orchestra —Warwick Braithwaite⟩ ⟨wants to get his own message ~ —W.F.Hambly⟩ (3) : into one's own possession : so as to be in control ⟨the university took it ~ —*Amer. Guide Series: Md.*⟩ ⟨took ~ after a revolt⟩ ⟨took ~ from a firm that had gone into liquidation —*Irish Digest*⟩ — compare TAKE OVER **d** : ASIDE ⟨throwing ~ traditional morality⟩ **2 a** : beyond, above, or in excess of some quantity or limit ⟨boys of twelve and ~⟩ **b** (1) : in or to excess : beyond the norm ⟨she was ~ canvassed —Peter Heaton⟩ ⟨they were seven minutes ~ —Goodman Ace⟩ (2) : INORDINATELY, EXCESSIVELY — often used in combination ⟨on his guard against *over*quick deductions —A.E.Duncan-Jones⟩ ⟨just naturally *over*registers emotion —*Current Biog.*⟩ ⟨*over*conservative traditionalists —John Arlott⟩ **c** : till a later time ⟨leave this new inquiry ~ till Monday —F.W.Crofts⟩ ⟨so glad you can stay ~⟩ **3 a** : ABOVE ⟨the plane was directly ~⟩ **b** : so as to cover, conceal, or affect the whole surface or expanse ⟨the original logs were boarded ~ —*Amer. Guide Series: Ark.*⟩ **4 a** : at an end — often used in the phrase *over with* ⟨hurrying to get the business ~ with⟩ **b** — used on a two-way radio circuit to indicate that a particular sentence or message is complete and that a reply is expected **5 a** (1) : from beginning to end : THROUGH ⟨read it ~ and let me know what you think⟩ (2) : in an intensive or comprehensive manner : THOROUGHLY ⟨the issue is worked ~ in the most . . . compelling scene of the play —Leslie Rees⟩ ⟨talk the matter ~⟩ **b** (1) : for a second or successive time : once more : AGAIN ⟨this work will have to be done ~⟩ ⟨read the difficult passage twice ~⟩ — often used in the phrase *over again* ⟨asked to recite the verse ~ again⟩ (2) : so as to be transformed or changed from a previous state or condition ⟨a man cannot make himself ~⟩

²over \ˈ\ *prep* [ME, adv. & prep., fr. OE *ofer* — more at ¹OVER] **1 a** (1) : used as a function word to indicate position higher up than and usu. directly above or near the object ⟨the elm tops in the west —Lucien Price⟩ ⟨towered ~ his diminutive mother⟩ ⟨leaned ~ the rampart⟩ (2) — used as a function word to indicate a surrounding condition or threatening prospect ⟨an atmosphere of doubt and uncertainty hung ~ the town⟩ (3) — used as a function word to indicate that the author's name is subscribed to a writing ⟨sent a letter to the paper ~ his own signature⟩ (4) : above the mental capacity or beyond the comprehension of — usu. used in the phrase *over the head of* ⟨his lecture was way ~ the heads of his audience⟩ **b** (1) — used as a function word to indicate submersion above a specified level ⟨~ his waist in water⟩ (2) — used as a function word to indicate extreme or acute embarrassment or difficulty of a specified kind ⟨~ head and ears in debt⟩ **2 a** — used as a function word to indicate the possession or enjoyment of authority, power, or jurisdiction in regard to some thing or person ⟨installed as minister ~ one of the largest congregations in the city⟩ ⟨unfailing in their service of those ~ them —E.R.Hughes⟩ **b** — used as a function word to indicate a relation of superiority, advantage, or preference to another ⟨the relative importance of the abstract ~ the pictorial —C.J. Bulliet⟩ ⟨taking an unprecedented lead ~ the other teams — *Current Biog.*⟩ ⟨this excess of wealth ~ population —W.P. Webb⟩; often used in the phrase *have it over* or *have it all over* ⟨the Britisher in America has it ~ the anthropologist —V.O. Key⟩ **c** — used as a function word to indicate suppression of or release from a passion, infatuation, or other strong feeling ⟨finally got ~ his mad⟩ ⟨never got ~ his love for the baroque —*Current Biog.*⟩ **d** — used as a function word to indicate someone or something that is overcome, circumvented, or disregarded in achieving an objective ⟨we got ~ him —Adrian Bell⟩ ⟨passed ~ the president's veto —*Current Biog.*⟩ **3 a** *archaic* : further than : BESIDES **b** : more than ⟨cost ~ five dollars⟩ **4 a** (1) : upon or down upon so as to rest, cover, or conceal from view ⟨~ which they throw a bridge of flowers — *Amer. Guide Series: La.*⟩ ⟨laid a blanket ~ the sleeping child⟩ ⟨a cap pulled low ~ his eyes⟩ ⟨got some blood ~ your face — Burt Arthur⟩ (2) : upon or down upon so as to change or otherwise influence in a pervasive manner ⟨don't know what has come ~ the girl⟩ (3) : ON, UPON ⟨hop people ~ the head —Bennett Cerf⟩ ⟨rap a child ~ the knuckles⟩ (4) — used as a function word to indicate change, variation, or difference from some other thing or period ⟨this year's copy contains no innovations ~ those in the past —*Springfield (Mass.) Daily News*⟩ ⟨a drop of three ~ 1956 —*Springfield (Mass.) Daily News*⟩ **b** (1) : at or to all the parts of the surface of : throughout a specified area ⟨the common toad is found ~ the entire state —*Amer. Guide Series: Minn.*⟩ ⟨packing and shipping concerns who sell the U.S. ~ —*Spokane (Wash.) Spokesman-Rev.*⟩ — often used with intensive *all* ⟨the rumor is all ~ Washington —*New Republic*⟩ ⟨votive chapels sprang up in his honor

EXHIBIT B
TO REBUTTAL STATEMENT
OF THOMAS LEMONS

IES LIGHTING HANDBOOK

1984 Reference Volume

JOHN E. KAUFMAN, PE, FIES
Editor

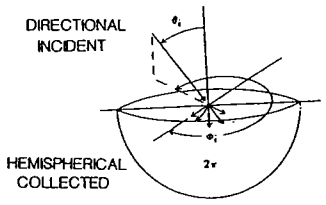
JACK F. CHRISTENSEN
Associate Editor

Published by
ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA
345 East 47th Street, New York, N.Y. 10017

ISBN 0-87995-015-3
Library of Congress Catalog Card Number: 84-81835

Second printing: March, 1990

PRINTED IN THE UNITED STATES OF AMERICA



directional lighting: lighting provided on the work-plane or on an object predominantly from a preferred direction. See *accent lighting, key light, cross light.*

disability glare: glare resulting in reduced visual performance and visibility. It often is accompanied by discomfort. See *veiling luminance.*

disability glare factor (DGF): a measure of the visibility of a task in a given lighting installation in comparison with its visibility under reference lighting conditions, expressed in terms of the ratio of luminance contrasts having an equivalent effect upon task visibility. The value of DGF takes account of the equivalent veiling luminance produced in the eye by the pattern of luminances in the task surround.

discomfort glare: glare producing discomfort. It does not necessarily interfere with visual performance or visibility.

discomfort glare factor: the numerical assessment of the capacity of a single source of brightness, such as a luminaire, in a given visual environment for producing discomfort. (This term is obsolete and is retained for reference and literature searches.) See *glare* and *discomfort glare.*

discomfort glare rating (DGR): a numerical assessment of the capacity of a number of sources of luminance, such as luminaires, in a given visual environment for producing discomfort. It is the net effect of the individual values of index of sensation for all luminous areas in the field of view. See *discomfort glare factor.*

distal stimuli: in the physical space in front of the eye one can identify points, lines and surfaces and three dimensional arrays of scattering particles which constitute the distal physical stimuli which form optical images on the retina. Each element of a surface or volume to which an eye is exposed subtends a solid angle at the entrance pupil. Such elements of solid angle make up the field of view and each has a specifiable luminance and chromaticity. Points and lines are specific cases which have to be dealt with in terms of total candlepower and candlepower per unit length.

distribution temperature (of a light source): the absolute temperature of a blackbody whose relative spectral distribution is the same (or nearly so) in the visible region of the spectrum as that of the light source.

dominant wavelength (of a light), λ_d: the wavelength of radiant energy of a single frequency that, when combined in suitable proportion with the radiant energy of a reference standard, matches the color of the light. See *complementary wavelength.*

downlight: a small direct lighting unit which directs the light downward and can be recessed, surface mounted or suspended.

downward component: that portion of the luminous flux from a luminaire emitted at angles below the horizontal. See *upward component.*

driving beam: See *upper beam.*

dual headlighting system: headlighting by means of two double units, one mounted on each side of the front end of a vehicle. Each unit consists of two lamps mounted in a single housing. The upper or outer lamps may have two filaments supplying the lower beam and part of the upper beam, respectively. The lower or inner lamps have one filament providing the primary source of light for the upper beam.

dust-proof luminaire: a luminaire so constructed or protected that dust will not interfere with its successful operation.

dust-tight luminaire: a luminaire so constructed that dust will not enter the enclosing case.

E

effective ceiling cavity reflectance, ρ_{cc}: a number giving the combined reflectance effect of the walls and ceiling of the ceiling cavity. See *ceiling cavity ratio.*

effective floor cavity reflectance, ρ_{pc}: a number giving the combined reflectance effect of the walls and floor of the floor cavity. See *floor cavity ratio.*

efficacy: See *luminous efficacy of a source of light* and *spectral luminous efficacy of radiant flux.*

efficiency: See *luminaire efficiency, luminous efficacy of a source of light* and *spectral luminous efficiency of radiant flux.*

electric discharge: See *arc discharge, gaseous discharge and glow discharge.*

electric-discharge lamp: a lamp in which light (or radiant energy near the visible spectrum) is produced by the passage of an electric current through a vapor or a gas. See *fluorescent lamp, cold-cathode lamp, hot-cathode lamp, carbon-arc lamp, glow lamp, fluorescent lamp, high intensity discharge lamp.*

NOTE: Electric-discharge lamps may be named after the filling gas or vapor that is responsible for the major portion of the radiation; *e.g.* mercury lamps, sodium lamps, neon lamps, argon lamps, etc.

A second method of designating electric-discharge lamps is by psysical dimensions or operating parameters; *e.g.* short-arc lamps, high-pressure lamps, low-pressure lamps, etc.

A third method of designating electric-discharge lamps is by their application; in addition to lamps for illumination there are photochemical lamps, bactericidal lamps, blacklight lamps, sun lamps, etc.

electroluminescence: the emission of light from a phosphor excited by an electromagnetic field.

electromagnetic spectrum: a continuum of electric and magnetic radiation encompassing all wavelengths. See *regions of electromagnetic spectrum.*

Examples of these applications are industrial heating, drying, baking and photoreproduction. However, some applications, such as infrared viewing devices, involve detectors sensitive to a restricted range of wavelengths; in such cases the spectral characteristics of the source and receiver are of importance.

initial luminous exitance: the density of luminous flux leaving a surface within an enclosure before interreflections occur.

NOTE: For light sources this is the luminous exitance as defined in *luminous flux density at a surface*. For non-self-luminous surfaces it is the reflected luminous exitance of the flux received directly from sources within the enclosure or from daylight.

instant start fluorescent lamp: a fluorescent lamp designed for starting by a high voltage without preheating of the electrodes.

NOTE: Also known as a cold-start lamp in some countries.

integrating photometer: a photometer that enables total luminous flux to be determined by a single measurement. The usual type is the Ulbricht sphere with associated photometric equipment for measuring the indirect luminance of the inner surface of the sphere. (The measuring device is shielded from the source under measurement.)

intensity: a shortening of the terms *luminous intensity* and *radiant intensity*. Often misused for level of illumination or illuminance.

interflectance: an alternate term for *room utilization factor*.

interflectance method: a lighting design procedure for predetermining the luminances of walls, ceiling and floor and the average illuminance on the work-plane based on integral equations. It takes into account both direct and reflected flux.

interflected component: the portion of the luminous flux from a luminaire arriving at the work-plane after being reflected one or more times from room surfaces, as determined by the *flux transfer theory*.

interflection: the multiple reflection of light by the various room surfaces before it reaches the work-plane or other specified surface of a room.

inter-reflectance: the portion of the luminous flux (lumens) reaching the work-plane that has been reflected one or more times as determined by the flux transfer theory. See Section 9.

interrupted quick-flashing light: a quick flashing light in which the rapid alternations are interrupted by periods of darkness at regular intervals.

inverse-square law: the law stating that the illuminance E at a point on a surface varies directly with the intensity I of a point source, and inversely as the square of the distance d between the source and the point. If the surface at the point is normal to the direction of the incident light, the law is expressed by $E = I/d^2$.

NOTE: For sources of finite size having uniform luminance, this gives results that are accurate within one percent when d is at least five times the maximum dimension of the source as viewed from the point on the surface. Even though practical interior luminaires do not have uniform luminance, this distance, d, is frequently used as the minimum for photometry of such luminaires, when the magnitude of the measurement error is not critical.

iris: an assembly of flat metal leaves arranged to provide an easily adjustable near-circular opening, placed near the focal point of the beam (as in an ellipsoidal reflector spotlight), or in front of the lens to act as a mechanical dimmer as in older types of carbon arc follow spotlights.

irradiance, E: the density of radiant flux incident on a surface.

isocandela line: a line plotted on any appropriate set of coordinates to show directions in space, about a source of light, in which the intensity is the same. A series of such curves, usually for equal increments of intensity, is called an isocandela diagram.

isolux (isofootcandle) line: a line plotted on any appropriate set of coordinates to show all the points on a surface where the illuminance is the same. A series of such lines for various illuminance values is called an isolux (isofootcandle) diagram.

K

key light: the apparent principal source of directional illumination falling upon a subject or area.

kicker: a luminaire used to provide an additional highlight or accent on a subject.

klieg light: a high intensity carbon arc spotlight, typically used in motion picture lighting.

L

laboratory reference standards: the highest ranking order of standards at each laboratory.

lambert, L: a lambertian unit of luminance equal to $1/\pi$ candela per square centimeter. The use of this unit is deprecated.

lambertian surface: a surface that emits or reflects light in accordance with Lambert's cosine law. A lambertian surface has the same luminance regardless of viewing angle.

Lambert's cosine law, $I_\theta = I_0 \cos\theta$: the law stating that the luminous intensity in any direction from an element of a perfectly diffusing surface varies as the cosine of the angle between that direction and the perpendicular to the surface element.

lamp: a generic term for a man-made source of light. By extension, the term is also used to denote sources that radiate in regions of the spectrum adjacent to the visible.

NOTE: A lighting unit consisting of a lamp with shade, reflector, enclosing globe, housing, or other accessories is also called a "lamp." In such cases, in order to distinguish between the assembled unit and the light source within it, the latter is often called a "bulb" or "tube," if it is electrically powered. See also *luminaire*.

lamp burnout factor: the fractional loss of task illuminance due to burned out lamps left in place for long periods.

lamp lumen depreciation factor, LLD: the multiplier to be used in illumination calculations to

directly on the ceiling.

suspended (pendant) luminaire: a luminaire hung from a ceiling by supports.

switch start fluorescent lamps: see *preheat fluorescent lamp.*

T

table lamp: a portable luminaire with a short stand suitable for standing on furniture.

tail lamp: a lamp used to designate the rear of a vehicle by a warning light.

talbot, T.: a unit of light; equal to one lumen-second.

tanning lamp: an ultraviolet lamp that radiates a significant portion of its radiative power in the UV-A and/or B band.

task lighting: lighting directed to a specific surface or area that provides illumination for visual tasks.

task-ambient lighting: a combination of task lighting and ambient lighting within an area such that the general level of ambient lighting is lower than and complementary to the task lighting.

taxi-channel lights: aeronautical ground lights arranged along a taxi-channel of a water aerodrome to indicate the route to be followed by taxiing aircraft.

taxi light: an aircraft aeronautical light designed to provide necessary illumination for taxiing.

taxiway lights: aeronautical ground lights provided to indicate the route to be followed by taxiing aircraft. See *taxiway-centerline lights, taxiway-edge lights, taxiway holding-post light.*

taxiway-centerline lights: taxiway lights placed along the centerline of a taxiway except that on curves or corners having fillets, these lights are placed a distance equal to half the normal width of the taxiway from the outside edge of the curve or corner.

taxiway-edge lights: taxiway lights placed along or near the edges of a taxiway.

taxiway holding-post light: a light or group of lights installed at the edge of a taxiway near an entrance to a runway, or to another taxiway, to indicate the position at which the aircraft should stop and obtain clearance to proceed.

temperature radiator: a radiator whose radiant flux density (radiant exitance) is determined by its temperature and the material and character of its surface, and is independent of its previous history. See *blackbody* and *graybody.*

thermopile: a thermal radiation detector consisting of a number of thermocouples interconnected in order to increase the sensitivity to incident radiant flux.

threshold: the value of a variable of a physical stimulus (such as size, luminance, contrast or time) that permits the stimulus to be seen a specific percentage of the time or at a specific accuracy level. In many psychophysical experiments, thresholds are presented in terms of 50 per cent accuracy or accurately 50 per cent of the time. However, the threshold also is expressed as the value of the physical variable that permits the object to be just barely seen. The threshold may be determined by merely detecting the presence of an object or it may be determined by discriminating certain details of the object. See *absolute luminance threshold, brightness contrast threshold, luminance threshold, modulation size threshold.*

threshold lights: runway lights placed to indicate the longitudinal limits of that portion of a runway, channel or landing path usable for landing.

top light: illumination of a subject directly from above employed to outline the upper margin or edge of the subject.

torchere: an indirect floor lamp sending all or nearly all of its light upward.

tormentor light: luminaire mounted directly behind the sides of the stage arch.

total emissivity: See *spectral-total directional emissivity* and *spectral-total hemispherical emissivity.*

touchdown zone lights: barettes of runway lights installed in the surface of the runway between the runway edge lights and the runway centerline lights to provide additional guidance during the touchdown phase of a landing in conditions of very poor visibility.

traffic beam: See *lower (passing) beams.*

train: the angle between the vertical plane through the axis of the searchlight drum and the plane in which this plane lies when the search light is in a position designated as having zero train.

transient adaptation factor, TAF: a factor which reduces the *equivalent contrast* due to readaptation from one luminous background to another.

transmission: a general term for the process by which incident flux leaves a surface or medium on a side other than the incident side, without change in frequency.

NOTE: Transmission through a medium is often a combination of regular and diffuse transmission. See *regular transmission, diffuse transmission,* and *transmittance.*

transmissometer: a photometer for measuring transmittance.

NOTE: Transmissometers may be visual or physical instruments.

transmittance, $\tau = \Phi_t/\Phi_i$: the ratio of the transmitted flux to the incident flux.

NOTE: Measured values of transmittance depend upon the angle of incidence, the method of measurement of the transmitted flux, and the spectral character of the incident flux. Because of this dependence complete information on the technique and conditions of measurement should be specified.

It should be noted that transmittance refers to the ratio of flux emerging to flux incident; therefore, reflections at the surface as well as absorption within the material operate to reduce the transmittance.

tristimulus values of a light, *X*, *Y*, *Z*: the amounts of each of three primaries required to match the color of the light.

troffer: a recessed lighting unit, usually long and installed with the opening flush with the ceiling. The term is derived from "trough" and "coffer."

troland: a unit of retinal illuminance which is based upon the fact that retinal illuminance is proportional to the product of the luminance of the distal stimulus and the area of entrance pupil. One troland is the retinal illuminance produced when the luminance of the distal stimulus is one candela per square meter and the area of the pupil is one square millimeter.

NOTE: The troland makes no allowance for interocular attenuation or for the *Stiles-Crawford effect.*

tube: See *lamp.*

tungsten-halogen lamp: a gas filled tungsten incandescent lamp containing a certain proportion of halogens in an inert gas whose pressure exceeds three atmospheres.

NOTE: The tungsten-iodine lamp (UK) and quartz-iodine lamp (USA) belong to this category.

turn signal operating unit: that part of a signal system by which the operator of a vehicle indicates the direction a turn will be made, usually by a flashing light.

U

ultraviolet lamp: a lamp which radiates a significant portion of its radiative power in the ultraviolet (UV) part of the spectrum; the visible radiation is not of principal interest.

ultraviolet radiation: for practical purposes any radiant energy within the wavelength range 10 to 380 nanometers. See *regions of electromagnetic spectrum.*

NOTE: On the basis of practical applications and the effect obtained, the ultraviolet region often is divided into the following bands:

Ozone-producing	180–220 nanometers
Bactericidal (germicidal)	220–300 nanometers
Erythemal	280–320 nanometers
"Black light"	320–400 nanometers

There are no sharp demarcations between these bands, the indicated effects usually being produced to a lesser extent by longer and shorter wavelengths. For engineering purposes, the "black light" region extends slightly into the visible portion of the spectrum. Another division of the ultraviolet spectrum often used by photobiologists is given by the CIE:

UV-A	315-400 nanometers
UV-B	280-315 nanometers
UV-C	100–280 nanometers

units of luminance: the luminance of a surface in a specified direction may be expressed in luminous intensity per unit of projected area of surface or in luminous flux per unit of solid angle and per unit of projected surface area.

NOTE: Typical units are the candela per square meter (lumen per steradian and per square meter) and the candela per square foot (lumen per steradian and per square foot).

The luminance of a surface in a specified direction is also expressed (incorrectly) in lambertian units as the number of lumens per unit area that would leave the surface *if the luminance in all directions within the hemisphere on the side of the surface being considered were the same as the luminance in the specified direction.*

NOTE: A typical unit in this system is the footlambert, equal to one lumen per square foot.

This method of specifying luminance is equivalent to stating the number of lumens that would leave the surface *if the surface were replaced by a perfectly diffusing surface with a luminance in all directions within the hemisphere equal to the luminance of the actual surface in the direction specified.* In practice no surface follows exactly the cosine formula of emission or reflection; hence the luminance is not uniform but varies with the angle from which it is viewed. For this reason, this practice is denigrated.

unrecoverable light loss factors: factors which give the fractional light loss that cannot be recovered by cleaning or lamp replacement.

upper (driving) beams: one or more beams intended for distant illumination and for use on the open highway when not meeting other vehicles. Formerly "country beam." See *lower (passing) beams.*

upward component: that portion of the luminous flux from a luminaire emitted at angles above the horizontal. See *downward component.*

utilance: See *room utilization factor.*

V

vacuum lamp: an incandescent lamp in which the filament operates in an evacuated bulb.

valance: a longitudinal shielding member mounted across the top of a window or along a wall and usually parallel to the wall, to conceal light sources giving both upward and downward distributions.

valance lighting: lighting comprising light sources shielded by a panel parallel to the wall at the top of a window.

values of spectral luminous efficiency for photopic vision, $V(\lambda)$: values for spectral luminous efficiency at 10-nanometer intervals (see Fig. 1–6) were provisionally adopted by the CIE in 1924 and were adopted in 1933 by the International Committee on Weights and Measures as a basis for the establishment of photometric standards of types of sources differing from the primary standard in spectral distribution of radiant flux. These values are given in the second column of Fig. 1–6; the intermediate values given in the other columns have been interpolated.

NOTE: These standard values of spectral luminous efficiency were determined by observations with a two-degree photometric field having a moderately high luminance, and photometric evaluations based upon them consequently do not apply exactly to other conditions of observation. Power in watts weighted in accord with these standard values are often referred to as *light-watts.*

values of spectral luminous efficiency for scotopic vision $V'(\lambda)$: values of spectral luminous efficiency at 10-nanometer intervals (see Fig. 1–5) were provisionally adopted by the CIE in 1951.

EXHIBIT C
TO REBUTTAL STATEMENT
OF THOMAS LEMONS

NEERING SOCIETY

for all matters concerning illumination. hat any trustee of knowledge must do wledge to the public for its welfare and

pecifically of the engineering aspects of ized about this professional viewpoint. emphasis that lighting's major goal is to Thus, the task of providing the external an appreciation and understanding of lated considerations. This is reflected in tion and the resultant broad scope of

Engineering Society include:

ENGINEERING

ting Engineering Society, published since ch as, current technical committee reports Lighting Data Sheets; latest articles on and industry.

ING PRACTICES

actices and I.E.S. Recommended Practices ks are published in booklet form. These ing, Residence Lighting, Street and High-

DATA SHEETS

showing photographs, plans, and other installations of all types.

PUBLICATIONS

ublishes in separate booklet form, I.E.S. specific lighting tasks; various guides for ighting calculations, and performance of

I.E.S. Publications are published periodi- be obtained by writing to Publications 0 Broadway, New York 23, N. Y.

IES Lighting Handbook

The Standard Lighting Guide

Third Edition
(First Printing)

Published by the
ILLUMINATING ENGINEERING SOCIETY
1860 BROADWAY, NEW YORK 23, N. Y.
1959

COMPOSED AND PRINTED
BY
MONUMENTAL PRINTING COMPANY
BALTIMORE, MARYLAND
1959

This Edition of th
review and revision
includes new informat
Society's objective in
with essential informa
condensed style.

The reviewing, revis
the Society's technical
Technical Director. T
500 individuals have s
a period of almost thr
leading to the final sul
scope of the Society's
sincere appreciation to

National El
Society of M

Herbert A. Ande
James R. Bale
Taylor M. Barr
Benjamin S. Ben
Edward I. Creed
H. E. D'Andrade
Joseph P. Ditchn
Ralph E. Farnha
Dr. Gorton R. F
Paul H. Goodell
James D. Hall
Alvin L. Hart
John P. Hoxie
Dr. Deane B. Juc

The preparation of t
and stimulation of thi
Society:

Marshall N. Wat

Editing and coordina
were carried out by Jc
Technical Director. T
policy and plans for ope

Interflectance: the ratio of the lumens received on the work plane to the lumens emitted by the luminaires.

Room ratio: a number indicating room proportions, calculated from length, width, and ceiling height.

Room index: a letter representing a range of room ratios.

Mounting height: the distance from the floor to the light center of the luminaire.

Spacing-to-mounting-height ratio: ratio of the distance between luminaires to the mounting height.

Maintenance factor: the ratio of the illumination on a given area after a period of time to the initial illumination on the same area. The initial illumination may be at a point or averaged over an area, but the final illumination must be evaluated in the same manner. The time at which the final value is measured must be representative of the conditions desired, i.e., at the time when the illumination has depreciated to a *minimum* or to an *average* value characteristic of the cleaning, servicing, and re-lamping schedule. The conditions should be specified by referring to "M.F. min." or "M.F. avg." The usual meaning is taken to be the minimum maintenance factor.

Troffer: a long recessed lighting unit usually installed with the opening flush with the ceiling; derived from "trough" and "coffer."

Louverall ceiling: a general lighting system comprising a wall-to-wall installation of multi-cell louvers shielding the light sources mounted above it.

Luminous ceiling: a lighting system comprising a continuous surface of diffusing material with light sources mounted above it.

Cove lighting: a system comprising light sources shielded by a ledge or horizontal recess, and distributing light over the ceiling and upper wall.

Cornice lighting: a system comprising light sources shielded by a panel parallel to the wall and attached to the ceiling, and distributing light over the wall.

Valance lighting: a system comprising light sources shielded by a panel parallel to the wall at the top of a window.

Directional lighting: lighting designed to illuminate the work plane, or an object, predominantly from a preferred direction.

Accent lighting: directional lighting to emphasize a particular object.

Mat surface: a surface from which the reflection is predominantly diffuse, with or without a negligible specular component.

Aviation Lighting Terms

Aeronautical light: any luminous sign or signal, recognized by competent authority, which is established, maintained, exhibited or operated as an aid to air navigation.

Aeronautical beacon: a light specifically provided as an aid to air navigation, visible at a
used to designate a par
Fixed light: a ligh
served from a fixed poi
Flashing light: a li
with dark periods.
Occulting light: a
longer duration than t
Undulating light:
crease in luminous int
Linear light: a lur
Conspicuity: the c
background so as to be
Visibility: the abil
expressed in units of c
objects by day and pro
Night: the hours b
beginning of morning
when the center of th
begins in the morning
low the horizon.)

Daylighting Terms

Altitude: the angu
great circle which pa
through the body and
the horizon to the zen
Azimuth: the angu
a given line or a celest
Sun bearing: the
through which a verti
be rotated to contain
Light, sun: direct
—, sky: visible r
—, ground: visil
faces below the plane
Sky, clear: less th
—, partly cloudy:
—, cloudy: more
—, overcast: 100
Solar time: time
taken as the instant i
meridian. (This is th
Clerestory: that
other parts, and whos
Fenestration: an
filled with media for c

Fig. 12-18. Wall mounted adjustable light for reading and general illumination.

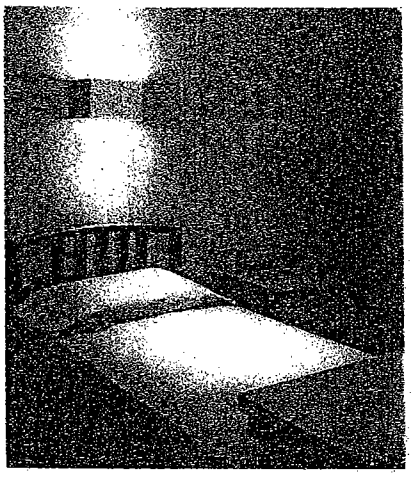


Fig. 12-19. Wall mounted non-adjustable light for reading and general illumination.

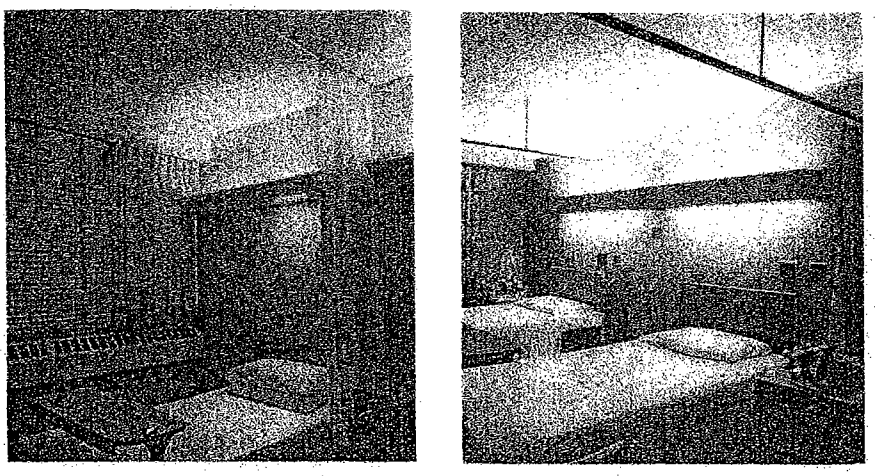
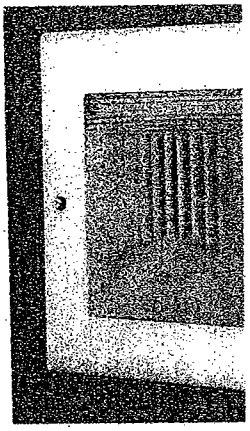


Fig. 12-20. Wall mounted non-adjustable light for reading and general illumination; left, for single-bed unit; and right, for two-bed unit.

porated into the patients' reading light. See Fig. 12-17. However, if such combination units are of the plug-in types, the receptacle should be switched at the door unless other suitable lighting is controllable at the door.

An examining light that will produce approximately 100 footcandles over a limited area should be provided. A fixed ceiling mounted examining lighting unit arranged to light the entire bed area might be un-



comfortably glaring
than required for
preferred by the ex
providing an exam
light, fixed or adju
floor-stand or hand-
depend upon the p

Nurses' station. needed for charting is needed at the m reading notation, instrument graduat

Autopsy rooms. lar to that for emer

X-ray and cobo therapy suites gene where records are ment rooms, which general illuminatio candles should be The viewing room operating rooms, t locations. (See Fig

Fluoroscopy ro to provide 10 footc a separate system foot switch conver adapted.

Dental suites.

Dental operator

EXHIBIT D
TO REBUTTAL STATEMENT
OF THOMAS LEMONS

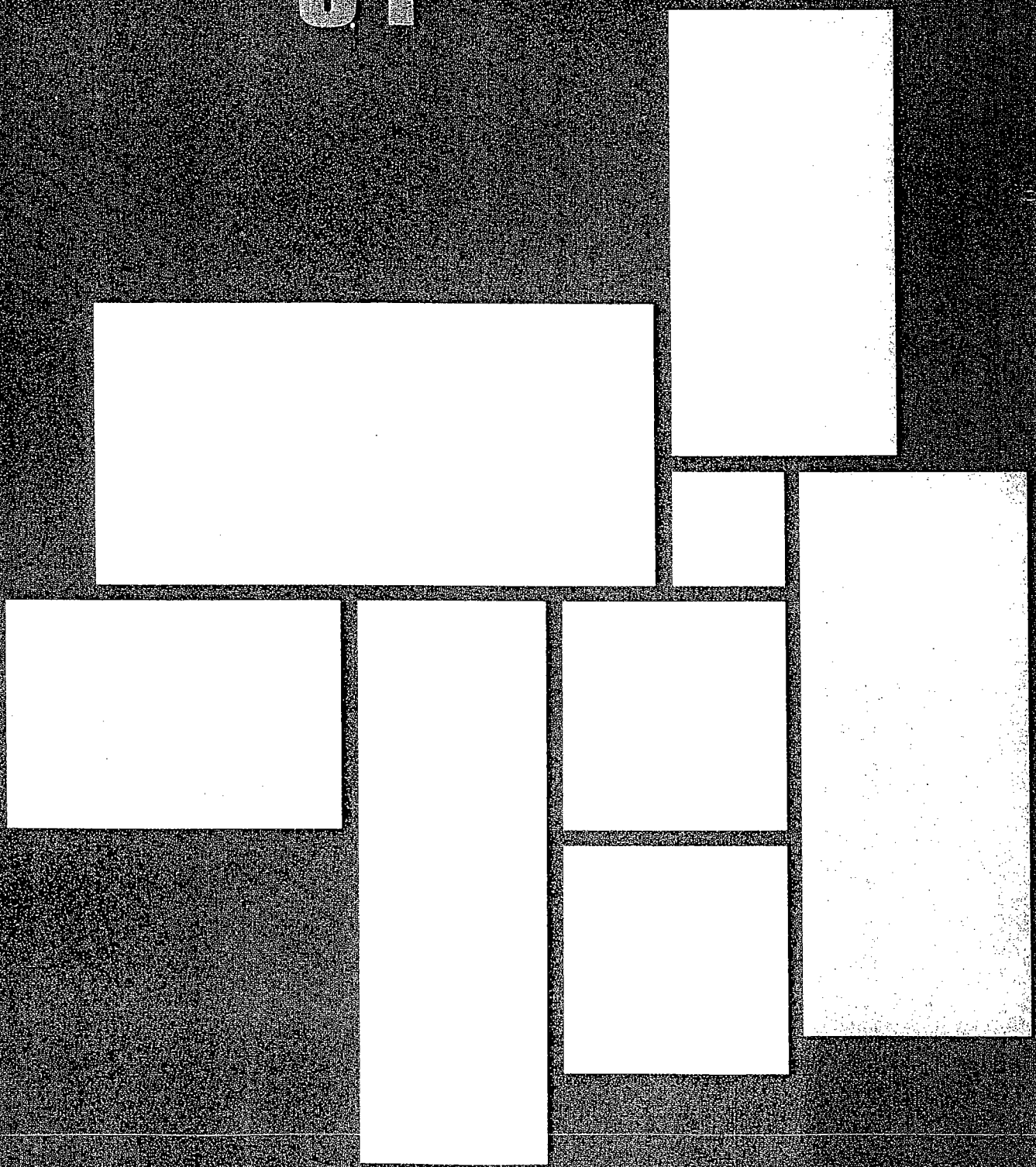
9.1/Co

Conwed

ceiling products

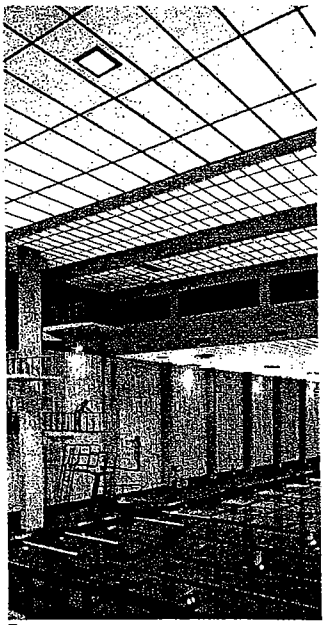
9 ACOUSTICAL TREATMENT

CONWED CORP 1976

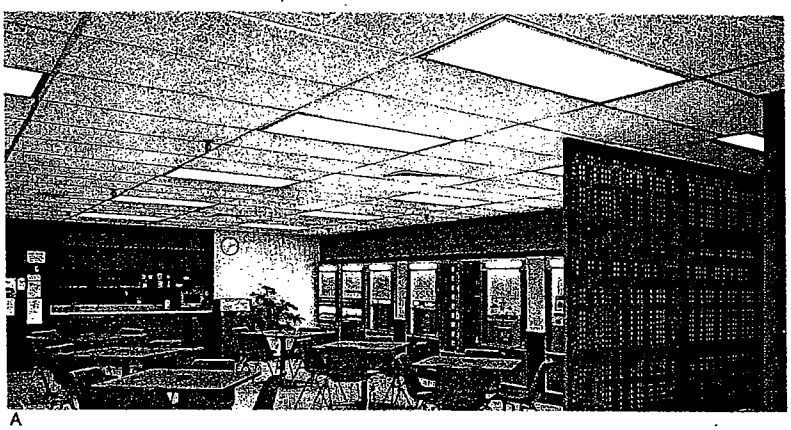


About the cover.

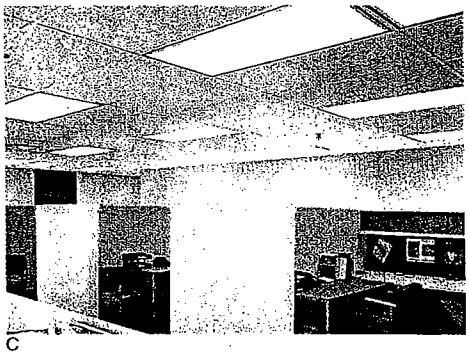
On the cover and throughout t. brochure is a design which graphically represents the variety of sizes available in the Conwed ceiling products family.



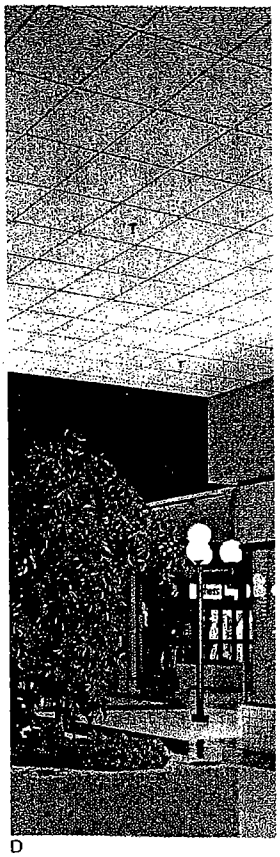
B



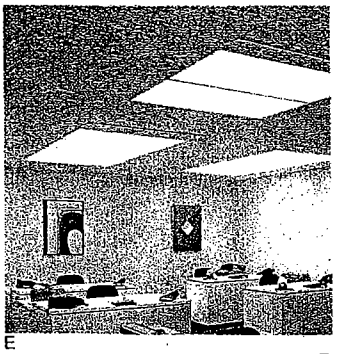
A



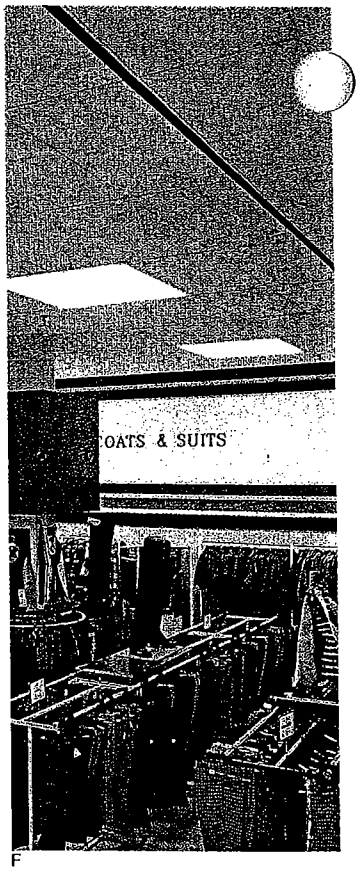
C



D



E



F

A. Regency ceiling
B. Ceramic ceiling
C. Regency ceiling
D. Rock Face (Reveal) ceiling
E. Natural Fissured ceiling
F. 1201 Air Bar

The performance data herein reflects Conwed's expectation based on tests conducted in accordance with ASTM, ABPA, and other recognized standard methods.

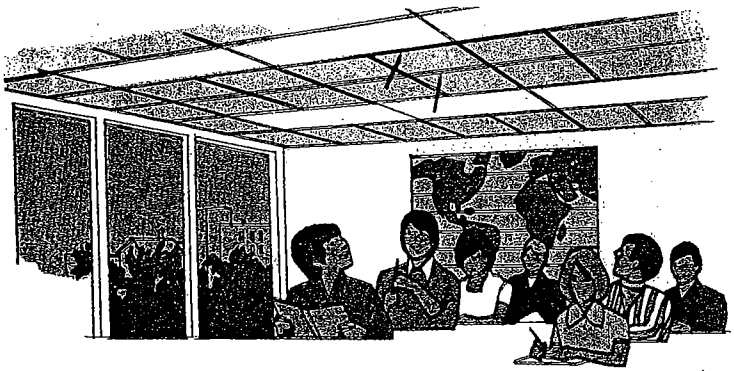
By presentation of this data, Conwed makes no express warranties concerning the characteristics, properties, availability or performance of these products, and specifically disclaims any implied warranties. This includes any warranty of merchantability or fitness for any particular purpose.

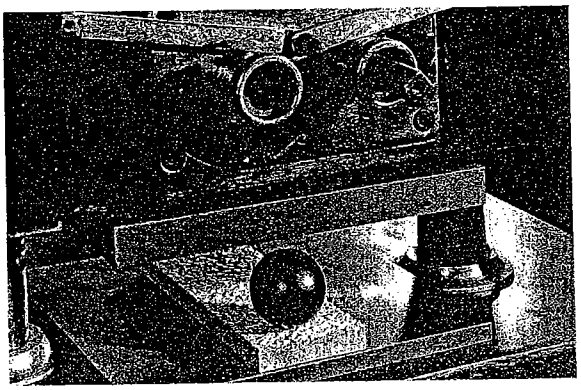
No agent, employee, or representative of Conwed is authorized to modify this disclaimer.

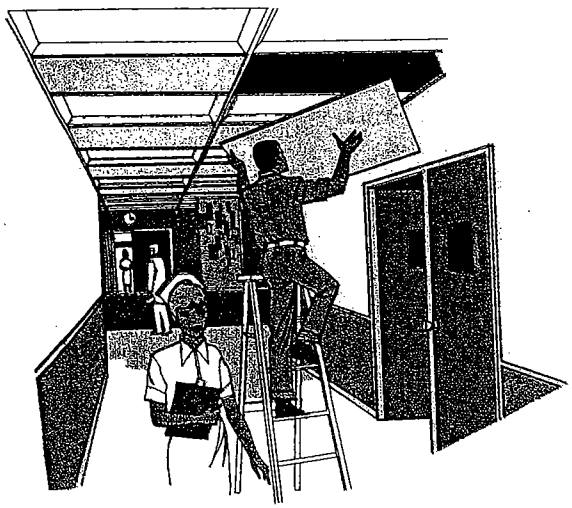
The case for abuse resistant ceilings in new installations and renovations.

Rock Face Ceilings are the solution wherever abuse is a problem: in schools, hospitals, churches, recreation centers, and main lobbies. Ceilings do get bumped by mop handles or ladders . . . scuffed by jumping kids or flying books . . . cracked or chipped during routine plenum maintenance. Rock Face panels minimize the damage potential, providing long-term savings.

When ceilings are noticeably scraped or scuffed, they've taken some abuse. New ceilings will get the same rough treatment. Make sure they can take it.



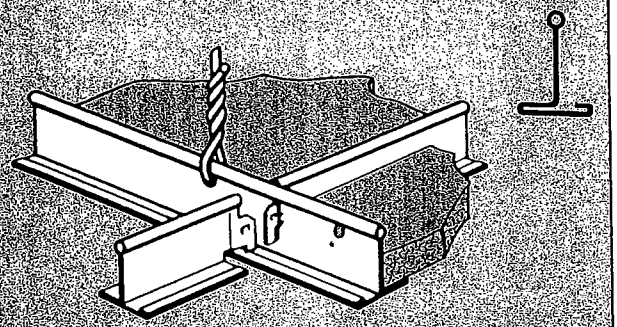




The hardness quality of the Rock Face surface is measured by the "ball hardness test." Rock Face tolerated an average resistance to surface deformation of 150 pounds using a 2 inch steel sphere. (ASTM C-637)

STANDARD PRODUCTS
SUSPENSION

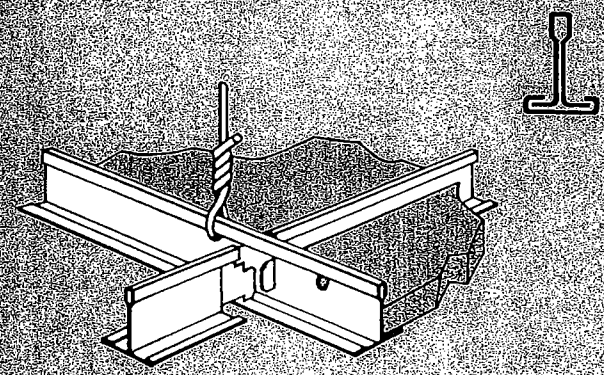
500 Series Snap-Grid® Exposed System



This widely used system features a choice of single or double web cross tees with identical locking devices at each end for ease of installation. Locking ends protect against lateral pull out yet permit removal for relocation at any time.

The single web (500 series) has a $^{15}/_{16}$" white face and cross tee slots 6" o.c. The double web has a 1" face with cross tee slots 12" o.c. Double web choices are white (530 series), black (580 series), aluminum cap (540 series); also available in walnut (570 series), and gold (590 series) on special order.

800 Series Exposed Grid System

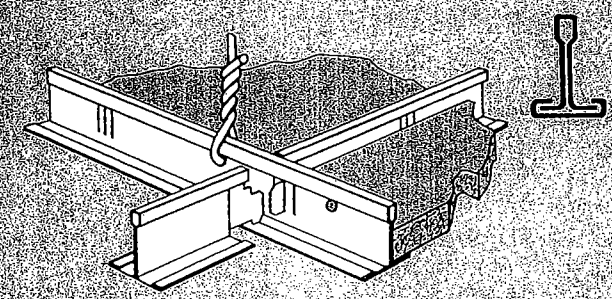


The 800 series features a $^{15}/_{16}$" face, double web construction and rectangular bulb design. The cross tee locking tabs prevent lateral pull out yet permit easy relocation. Choices include white face cappings (800, 810, and 811 series) aluminum caps and finish (840 series), walnut facings (870 series), and black facings (880 series).

An all aluminum (830 series) system provides resistance to corrosion caused by moisture and most chemical vapors. This series is particularly desirable for areas such as swimming pools and kitchens.

Where the suspension system must have a low light reflectance a special low gloss finish is provided in the 1911 series.

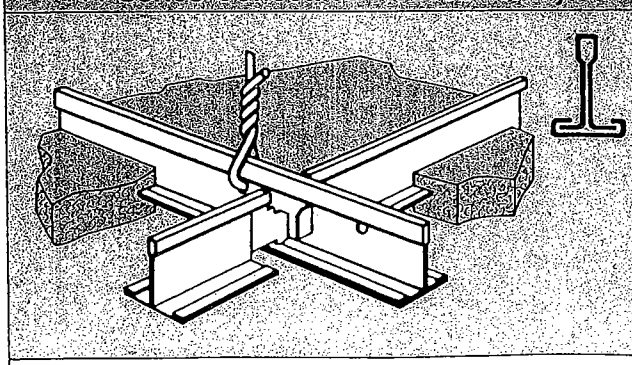
818 Series Exposed Grid System



Components of this exposed system offer all the features of the 800 series, plus greater flexibility for 60" x 60" modules.

Cross tee slots are placed in groups of three 2" o.c. every 10" along 10' main runners, and 10" o.c. from both ends of the 5' cross tees. This allows reversal of module direction and 60" x 20" openings.

444 Series Concealed Accessible System



Downward as well as upward access is available for concealed tile with the 444 system. Downward access is gained by opening the access components downward with an Access key, and removing those tile.

For direct access without an Access key, replace concealed cross tees at desired locations with downward access tees and angles, or upward top and bottom access angles. System rigidity and proper spacing is maintained by incorporating one of the following methods at least every four to six feet:

1. Locking concealed cross tees.
2. #826 spacer bars which lock onto the main runner bulbs.
3. #431 spacer clips which lock concealed cross tees together.

EXHIBIT E
TO REBUTTAL STATEMENT
OF THOMAS LEMONS

Rapid Lighting Design and Cost Estimating

A HANDY, QUICK METHOD FOR LIGHTING DESIGN AND CALCULATION OF INSTALLATION PRICES

Prafulla C. Sorcar, P. E.

McGraw-Hill Book Company New York St. Louis San Francisco Auckland Bogotá Düsseldorf Johannesburg London Madrid Mexico Montreal New Delhi Panama Paris São Paulo Tokyo Singapore Sydney Toronto

Library of Congress Cataloging in Publication Data

Sorcar, Prafulla C
Rapid lighting design and cost estimating.

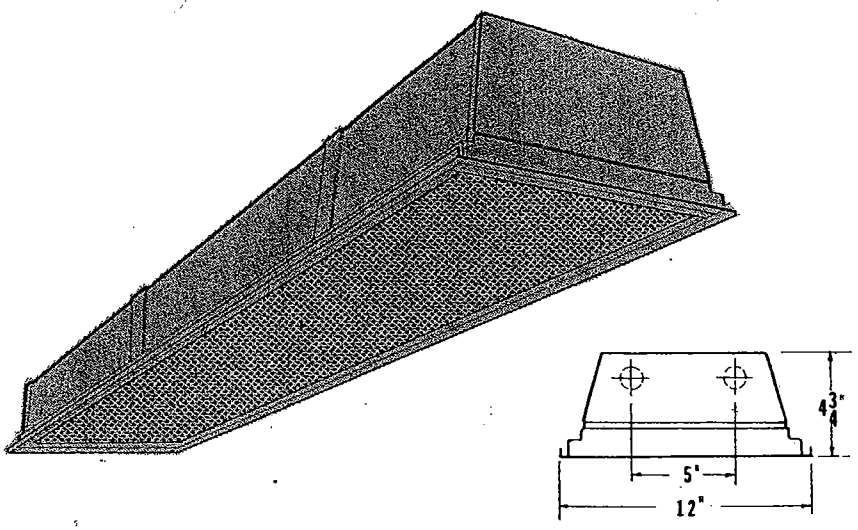
Includes index.
1. Electric lighting. 2. Electric lighting—Estimates. I. Title.
TK4169.S64 621.32'2 79-4690
ISBN 0-07-059651-4

1 2 3 4 5 6 7 8 9 0 HDHD 7 8 6 5 4 3 2 1 0 9

The editors for this book were Tyler G. Hicks and Carolyn Nagy, the designer was Naomi Auerbach, and the production supervisor was Sally Fliess. It was set in Times Roman Italic by Florence Lanaro.

It was printed and bound by Halliday Lithograph.

Recessed Fluorescent Troffers



B-2

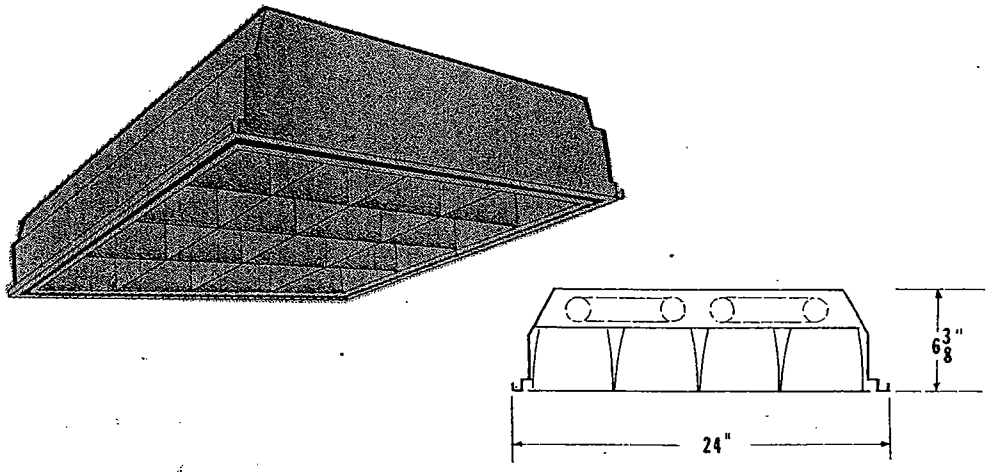
Description	1- X 4-ft troffer
Lamps	Two F40 T12, 3200 lm each, 20,000 h
Lens	Acrylic prismatic lens
Spacing ratio	1.1
Visual comfort probability	62 (length)/61 (cross)
Maintenance factors	0.75/0.70/0.65
Conversion factors	A. Unit with two F40 T12 lamps = 1.0 B. Unit with three F40 T12 lamps= 1.5

COST DETAILS PER LUMINAIRE

Type of unit	Input, W	Contractor's price		Installed cost	
		Grid	Flange	Grid	Flange
A	93	$44	$45	$74.75	$77.75
B	146	54	55	90	92.75

The installed cost includes published contractor's book price for the luminaire with lens and ballast, number of lamps as shown, luminaire fastening devices, 6-ft length of 3/8-in flexible metallic conduit with two 7-ft lengths of no. 12 AF wire, two connectors, and the labor required for recess mounting and connection of the luminaire. *See page B–52 to add a luminaire outlet recessed above ceiling.*

1- X 4-ft troffers are used mostly in corridors, between aisles, and in library stack areas.



Description	2- X 2-ft parabolic-louvered troffer
Lamps	Two F40/U T12, 3025 lm each, 12,000 h
Louvers	Parabolic reflector cells of specular anodized aluminum
Spacing ratio	1.3
Visual comfort probability	92 (length)/91 (cross)
Maintenance factors	0.90/0.85/0.80
Input, W	93

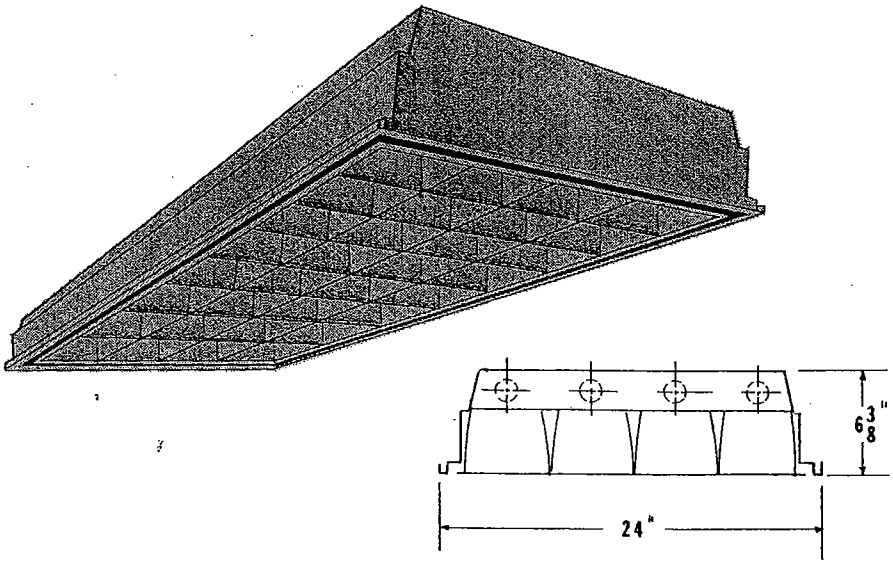
COST DETAILS PER LUMINAIRE

Type of unit	Contractor's price	Installed cost
Grid	$65	$ 99
Flange	76	114.25

The installed cost includes published contractor's book price for the luminaire with louvers and ballast, number of lamps as shown, luminaire fastening devices, 6-ft length of 3/8-in flexible metallic conduit with two 7-ft lengths of no. 12 AF wire, two connectors, and the labor required for recess mounting and connection of the luminaire. See paeg B–52 to add a luminaire outlet recessed above ceiling.

This handsome unit, with deep parabolic reflector cells of specular anodized aluminum, provides illumination with low apparent brightness. Open louvers, having no static charge and no dirt- or grime-collecting surfaces, assure high maintenance factors.

B-20



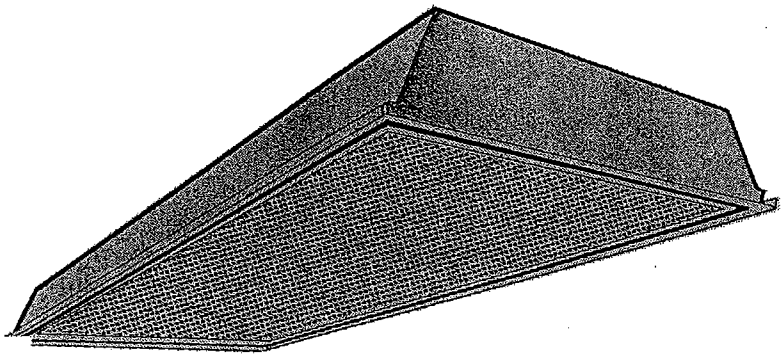
Description	2- X 4-ft parabolic louvered troffer
Lamps	Four F40 T12, 3200 lm each, 20,000 h
Louvers	Parabolic reflector cells of specular anodized aluminum
Spacing ratio	1.3
Visual comfort probability	90 (length)/91 (cross)
Maintenance factors	0.90/0.85/0.80
Input, W	186

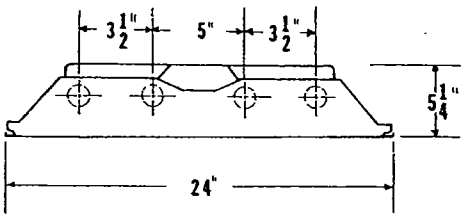
COST DETAILS PER LUMINAIRE

Type of unit	Contractor's price	Installed cost
Grid	$ 95	$143.25
Flange	107	159

The installed cost includes published contractor's book price for the luminaire with louvers and ballasts, number of lamps as shown, luminaire fastening devices, 6-ft length of 3/8-in flexible metallic conduit with two 7-ft lengths of no. 12 AF wire, two connectors, and the labor required for recess mounting and connection of the luminaire. *See page B–52 to add a luminaire outlet recessed above ceiling.*

This handsome unit, with deep parabolic cells of specular anodized aluminum, provides illumination with low apparent brightness. Open louvers, having no static charge and no dirt- or grime-collecting surfaces, assure high maintenance factors.





Description	2- X 4-ft troffer with Day-Brite VIP lens
Lamps	Four F40 T12, 3200 lm each, 20,000 h
Lens	Day-Brite VIP lens
Spacing ratio	1.77
Visual comfort probability	53 (length)/52 (cross)
Maintenance factors	0.75/0.70/0.65
Input, W	186

COST DETAILS PER LUMINAIRE

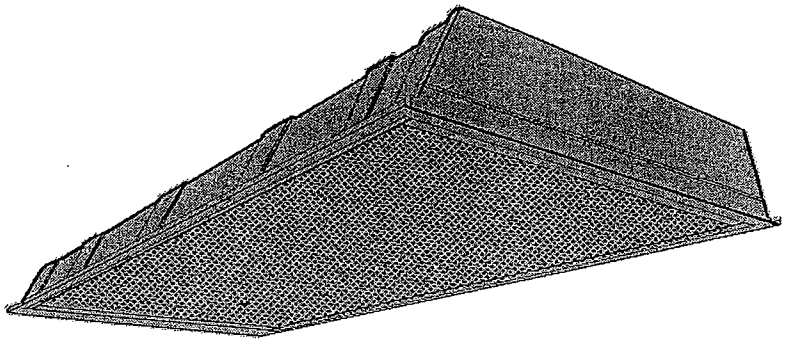
Type of unit	Contractor's price	Installed cost
Grid	$82	$127.50
Flange	89	136.75

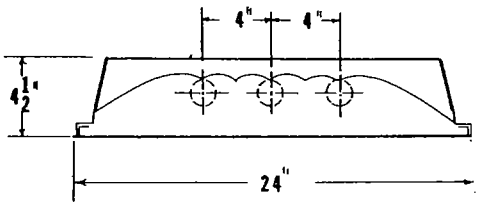
The installed cost includes published contractor's book price for the luminaire with lens and ballasts, number of lamps as shown, luminaire fastening devices, 6-ft length of 3/8-in flexible metallic conduit with two 7-ft lengths of no. 12 AF wire, two connectors, and the labor required for recess mounting and connection of the luminaire. See page B-52 to add a luminaire outlet above ceiling.

Luminaires with this special diffusing medium provide uniform lighting with extra-widespread distribution. These luminaires are widely used in office buildings.

The reference luminaire is as manufactured by Day-Brite, Mobilex unit.

This information was based on test 6289, prepared by Day-Brite Lighting Division, Emerson Electric.





Description	2- X 4-ft troffer (Gibson EE system)
Lamps	Three F40 T12, 3200 lm each, 20,000 h
Lens	Gibson EE lens
Reflector	Specular anodized aluminum
Spacing ratio	1.7
Visual comfort probability	56 (length)/47 (cross)
Maintenance factors	0.75/0.70/0.65
Input, W	146

COST DETAILS PER LUMINAIRE

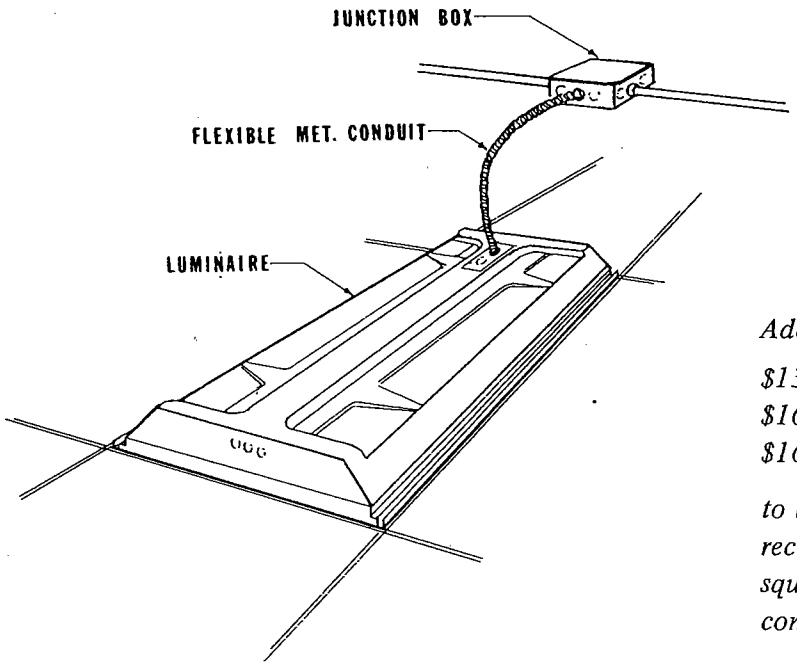
Type of unit	Contractor's price	Installed cost
Grid	$ 96	$141.50
Flange	103	152

The installed cost includes published contractor's book price for the luminaire with lens and ballasts, number of lamps as shown, luminaire fastening devices, 6-ft length of 3/8-in flexible metallic conduit with two 7-ft lengths of no. 12 AF wire, two connectors, and the labor required for recess mounting and connection of the luminaire. See page B–52 to add a luminaire outlet recessed above ceiling.

Luminaires with this special reflecting surface and the diffusing medium provide uniform illumination with extra-widespread distribution. These luminaires are widely used in institutions and office buildings.

This information was based on ERL report 2134, prepared for Gibson Lighting, Americus, Georgia.

INSTALLED COST OF OUTLETS AB. _ CEILING



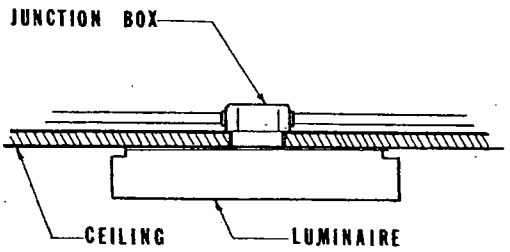
B-52

Add

$13.25 for EMT terminal
$16.70 for GRC terminal
$16.70 for IMS terminal

to the luminaire installed cost for an outlet recessed above ceiling, which includes a 4-in square box, blank cover, bar hanger, two connectors for conduit, and two wire nuts.

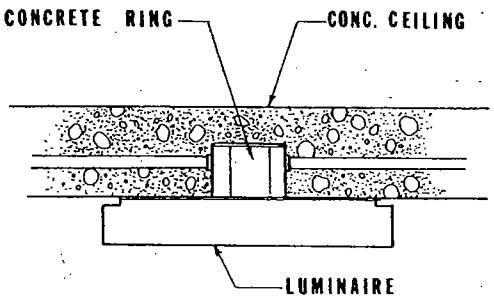
INSTALLED COST OF FLUSH-MOUNTED OUTLETS



Add

$12.88 for EMT terminal
16.38 for GRC terminal
16.38 for IMS terminal

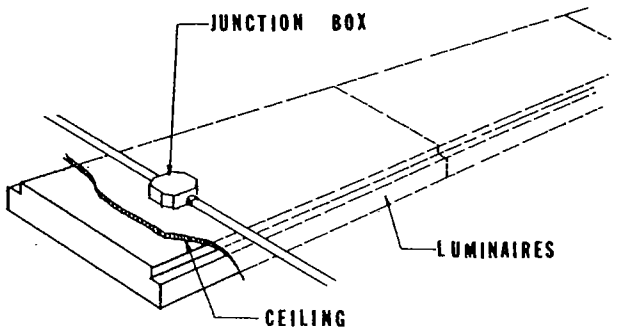
to the luminaire installed cost for an outlet flush-mounted to a suspended or furred ceiling, which includes a 4-in octagon box, adjustable bar hanger, two connectors, plaster ring, and two wire nuts.



Add

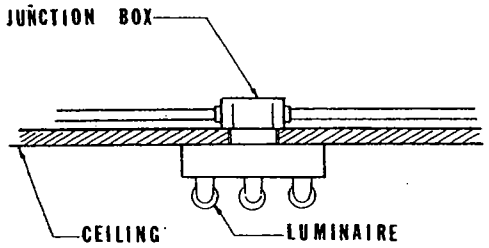
$12.18 for EMT terminal
15.84 for GRC terminal
15.84 for IMS terminal

to the luminaire installed cost for an outlet flush-pan- or deck-mounted in concrete, which includes a 4-in concrete ring, connectors for the type of conduit required, cover plate, and two wire nuts.



In a series of luminaire connections as on the left, where all luminaires are internally connected and only one outlet is required for service entrance, add all individual luminaire installed costs and one outlet installed cost as necessary, as shown above.

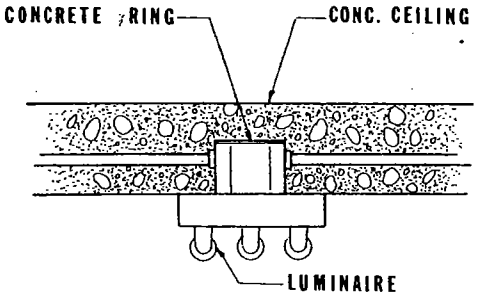
Direct-mount



Add

$12.88 for EMT terminal
16.38 for GRC terminal
16.38 for IMS terminal

to the luminaire installed cost for an outlet flush-mounted to a suspended or furred ceiling, which includes a 4-in octagon box, adjustable bar hanger, two connectors, plaster ring, and two wire nuts.

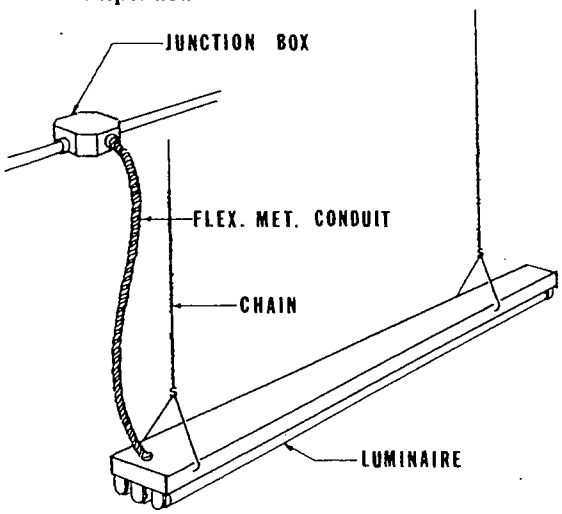


Add

$12.18 for EMT terminal
15.84 for GRC terminal
15.84 for IMS terminal

to the luminaire installed cost for an outlet flush-pan- or deck-mounted in concrete, which includes a 4-in concrete ring, connectors for the type of conduit required, cover plate, and two wire nuts.

Chain-suspended



Add

$4.50 for each chain suspension which includes a 3-ft chain, two S hooks, and a Y hook. Add $0.50 for each additional 1-ft length of chain.

For a surface-mounted outlet to feed the chain-suspended luminaire add as shown below:

Type terminal	Type of construction		
	Steel	Wood	Concrete
EMT	13.78	$13.60	$16.33
GRC	18.88	18.70	21.43
IMS	18.88	18.70	21.43

This includes an octagon outlet box with a 6-ft length of flexible metallic conduit having 8-ft long 2 no. 12 AF wire, two connectors, and two wire nuts.

EXHIBIT F
TO REBUTTAL STATEMENT
OF THOMAS LEMONS

The Optical Design of Reflectors

WILLIAM B. ELMER

SECOND EDITION

John Wiley & Sons, New York/Chichester/Brisbane/Toronto

Library of Congress Cataloging in Publication Data:

Elmer, William B
The optical design of reflectors.

(Wiley series in pure and applied optics)
Bibliography: p.
Includes index.
1. Reflectors, Lighting—Design and construction.
2. Reflection (Optics) I. Title.

TH7970.R4E37 1979 621.32'2 79-14206
ISBN 0-471-05310-4

Printed in the United States of America

10 9 8 7 6 5 4 3 2

T
that t

The single
Euclid's Geomet

Euclid

E

is available to the reflector
al softening of the striations
it images or reflector surface
spread out a sharp peak of
n which case radial circular

conical peens will give better
tern. Radial V-grooves with
symmetric street light reflec-
ux through the lamp stem or
preciably. Oval peens have
tangential directions, and to
; compound curvatures. The
gonal radii calculated on the

in radius of curvature of a
can be appropriately grad-
npracticable to make peens
er or much larger than 0.150
approaching these values, it
eters in judiciously selected
he tooling of a reflector has
innumerable times.

pressed to find a quick and
m from his newly designed
hemical or electrochemical
ding, or other improvised
ith the possible exception of
rue spreading, although ac-
sually with severe losses in
t (without cracked pieces)
essures used in shotblasting
rface which are folded by
Sandblasting usually leaves
bedded in the metal or plas-

s a microscopic roughening
isfactory results like those
which destroys most of the

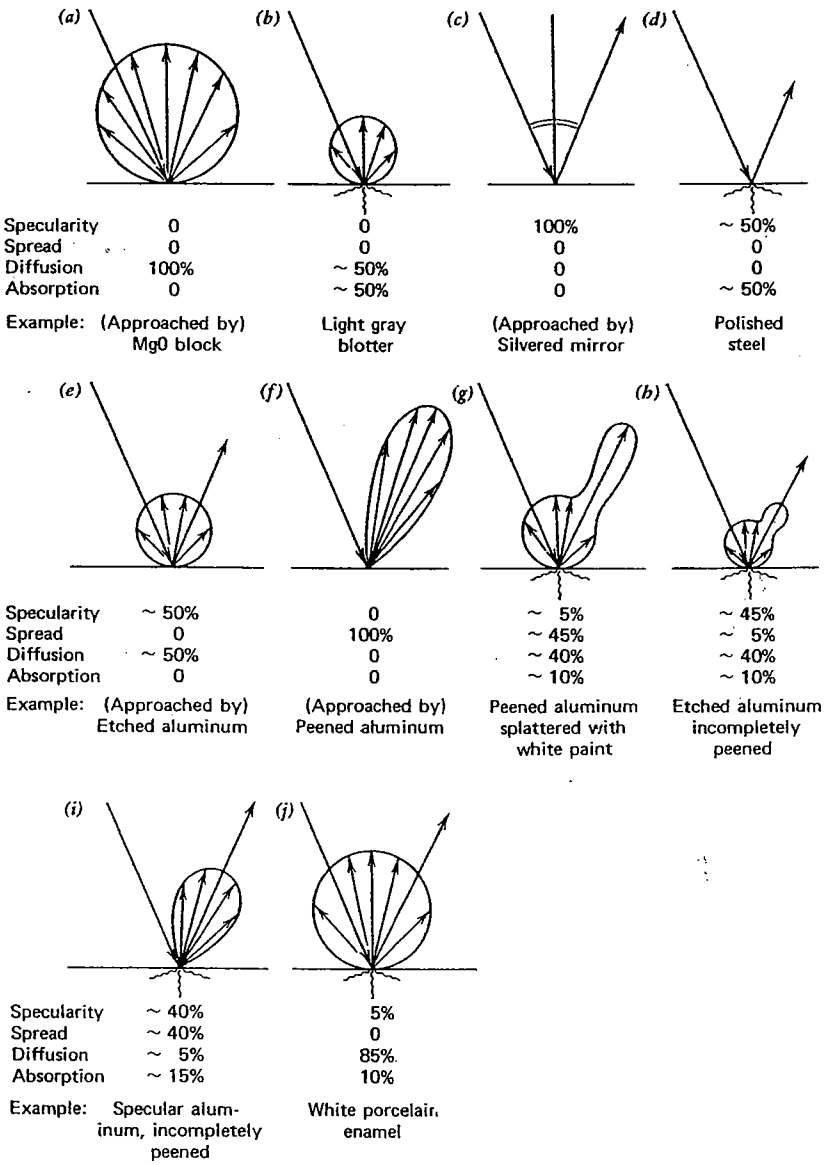


Figure 9. Varieties of reflector characteristics.

EXHIBIT G
TO REBUTTAL STATEMENT
OF THOMAS LEMONS

8TH EDITION

LIGHTING HANDBOOK

REFERENCE & APPLICATION

MARK S. REA, PH.D. FIES
EDITOR-IN-CHIEF
RENSSELAER POLYTECHNIC INSTITUTE

ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA
NEW YORK

Managing Editor: Judith Block
Production Manager: Judith Block
Editorial Assistant: John Bullough
Copyeditor: Joseph C. Fineman
Illustrators: Bruce Kaiser and DeWitt Gorman
Indexer: Robert J. Richardson
Typesetting and graphics: Science Typographers, Inc.
Marketing: Beth Bay
Cover design: Tony Picco

LIGHTING HANDBOOK, Eighth Edition

ISBN 0-87995-102-8

Library of Congress Catalog Card Number: 93-78569

Printed in the United States of America.

The Illuminating Engineering Society of North America welcomes your comments. Please send all correspondence to:

Publications Department
IESNA
120 Wall Street, 17th Floor
New York, NY 10005

light may be used. The luminance of luminaires and nearby surroundings should be less than 310 cd/m^2 (30 cd/ft^2) as seen from the patient's bed or any normal reading position.

Luminaires to meet these conditions should have low luminance. One or more such luminaires in a single- or multiple-occupancy room may be needed to provide general lighting 760 mm (30 in.) above the floor for normal use. To prevent excessive spottiness of general lighting, the installation should provide a lighting level ratio of not more than 1:5 on a horizontal plane 760 mm (30 in.) above the floor within a radial distance of 2.4 m (8 ft) from the point of maximum illuminance on that plane.

Observation of Patients. Provision should be made for local low-level illumination of a color quality that will allow for proper diagnosis of the patient's appearance. There should be lighting at each bed and its floor area so that the nurse can frequently observe the patient and equipment, such as drainage tubes and containers, during the night, with minimum disturbance to patients. This light should be switched at the door, and may also be controlled by a dimmer. When the observation lighting must be left on all night, or when higher levels are needed, temporary screening from other patients may be necessary.

NIGHT LIGHTING. Wall-bracket combination lighting units for patients' use frequently incorporate a night light with switch at the bed. Such a light is desirable for occasional use by patient or nurse; however, when left on continuously, its luminance in the surrounding field of darkness is sometimes a source of annoyance to patients wishing to sleep.

For continuous use, the night light recommended incorporates a low-brightness luminaire with louvered or refractive cover, flush wall type, installed so that its center is approximately 360 mm (14 in.) above the floor, to direct a low illuminance along the floor where it is needed for moving about the room.

For night lighting it is most important to limit the source luminance. This luminance should not exceed 70 cd/m^2 (6.5 cd/ft^2) for continuous use, or 200 cd/m^2 (19 cd/ft^2) for a short time.

EXAMINATION LIGHTING. The lighting for *examining* patients in their rooms should be of a color quality that will not distort skin or tissue color, of a directionality to permit careful inspection of surfaces and cavities, and shadowless. When curtains are used to isolate a patient, others in the room are protected from the examining lamp; however, whether fixed or portable, the examination lighting should be confined to the bed area and provide adequate lighting over a circular area 0.6 m (2 ft) in diameter.

Examination lights are defined as those luminaires used for minor medical procedures outside the operating room. Examples of these procedures are tissue examination and suture removal. Examination/treatment units range from a simple gooseneck lamp to a luminaire similar to an operating room unit, depending on the complexity and nature of the visual task. The following criteria should be considered when selecting luminaires for examination:

1. *Distance.* Adequate illumination should be available at a distance of 1070 mm (42 in.). In treatment rooms, the focal length of the luminaire should be compatible with the task to be observed, typically 600–910 mm (24–36 in.).
2. *Radiation.* For patient safety and comfort, the luminaire should be designed with a heat filtration system. At maximum intensity, the lighting unit at a distance of 1060 mm (42 in.) from the field should produce no more than 25,000 μW/cm^2 in the field.
3. *Color Correction.* The luminaire should provide good color rendering of tissue. The color temperature should be between 3500 and 6700 K.
4. *Mobility.* The unit should move freely and be easily positioned with one hand. Once the luminaire is positioned, the mounting system should permit it to remain stationary without drifting. Articulation of the unit should require 23 kg (5 lb) or less of force by the user.
5. *Safety.* Safety of the user and patient should be addressed by considering (a) the surface temperatures of the luminaire, (b) the tipping hazard, (c) electrical safety and (d) the durability of external surfaces. The placement of fixed, flexible arm units should be reviewed carefully, especially with older patients who may reach out to use the arm for support, which it will not provide.

Patient Use. Patient use implies control by the patient for reading, visiting, self-care or viewing television. This control must be limited to prevent annoyance to other patients.

The reading light should provide light at the normal reading position, assumed to be 1140 mm (45 in.) above the floor. To allow the patient freedom to turn in bed without moving out of the reading light zone, the area of the reading plane (lighted by an adjustable unit) should be approximately 0.3 m^2 (3 ft^2), and for a nonadjustable unit the area should be approximately 0.7 m^2 (6 ft^2). To provide a reasonable degree of uniformity of light over these recommended areas, the lighting level at the outer edge of each area should not be less than two-thirds of the lighting level at the center. To provide comfortable lighting conditions for reading, the luminance in candelas per square meter on the ceiling, provided by some means of general

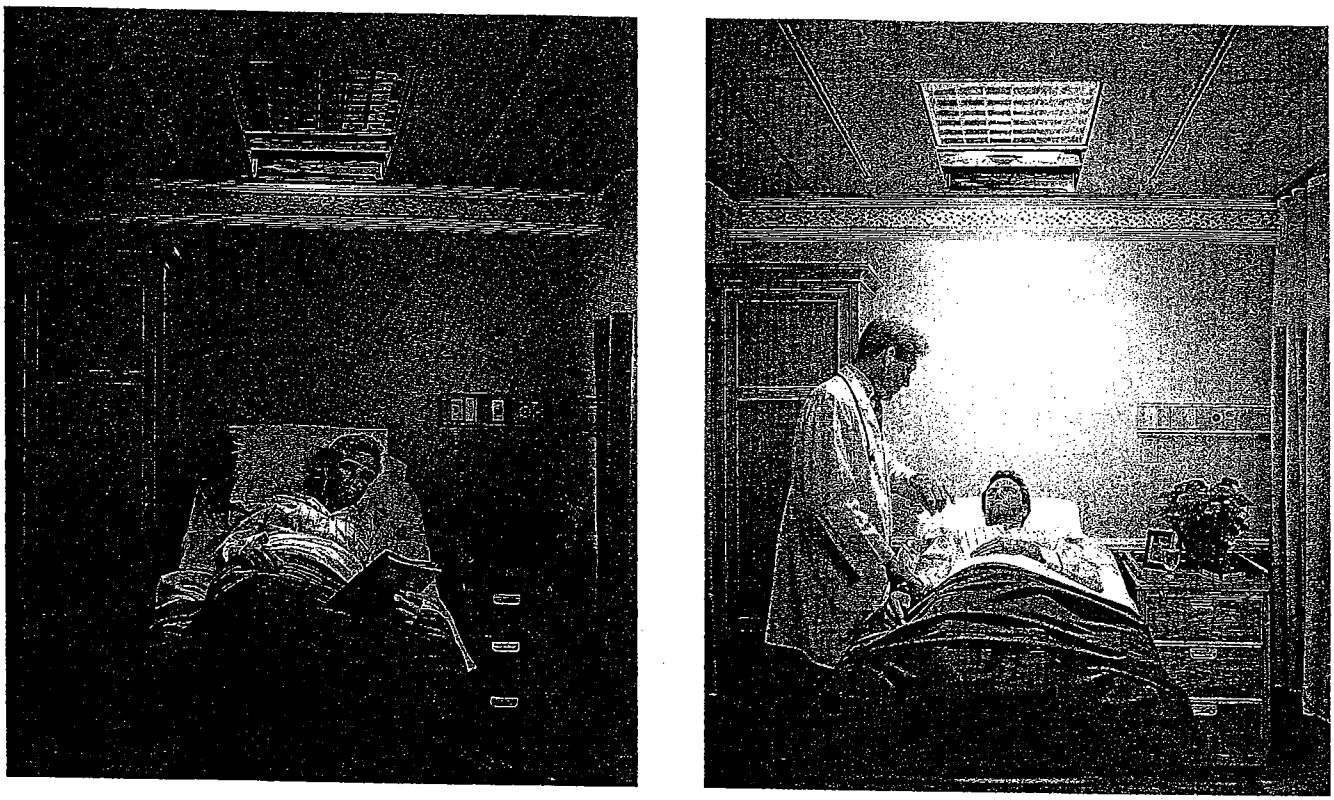


Fig. 17-7. Patient room lighting. Left: Reading light, which positions light directly onto the patient's reading material with no reflected glare. Right: Examination light, which can be controlled with a wall switch by hospital staff, utilizes compact fluorescent lamps for excellent color rendition.

lighting, should be at least equal to the illuminance in 1/p lux on the reading matter.

The luminance of the reading lamp and of any surface illuminated by it, as seen from the patient's bed or any normal reading position, should be less than 310 cd/m^2 (30 cd/ft^2). This condition is admittedly difficult to satisfy and entails a careful choice of luminaire and built-in limitations to its movement. See figure 17-7.

Housekeeping. A very important consideration is the lighting for housekeeping functions. Housekeepers need to see dust or dirt to remove it, including that beneath the furniture. Oblique lighting should be provided over horizontal surfaces to observe dust.

Nursing Stations. In most hospitals a nursing unit is coordinated around a nursing station (see figure 17-8). Here charts are stored, read and written. A desk or shelf is invariably provided, usually against some type of counter or below a hung cabinet. Lighting mounted beneath this counter should provide for the task. It should be so arranged that it supplements the overall illumination of the station.

Some of this lighting will be in continuous use, night and day, and this should be considered in the lighting plan for the station. Usually, although by no means universally, when the nursing station is not visible from any of the patient accommodations, general ceiling

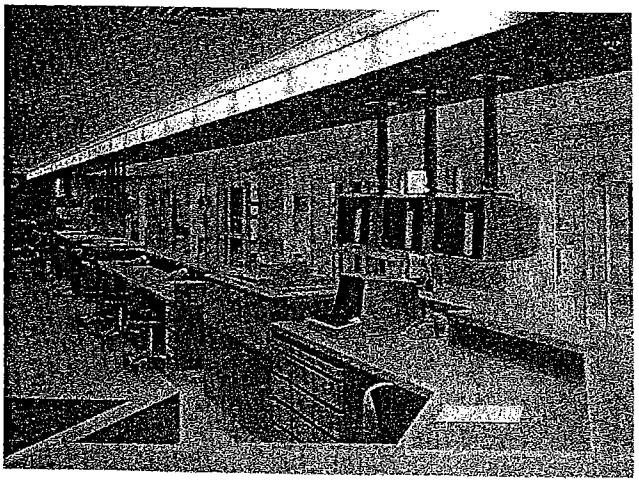


Fig. 17-8. Lighting at a nurses' station is multilevel, to allow for a higher illumination during the day and a lower level at night. The lighting is designed to allow for the critical task of reading patient information from the computer screen. Undercounter task lights also function as night lights.

sources remain lighted during the night hours. Also the luminaires beneath counters, placed so that a person sitting at the desk is shielded from glare, should not be within the patient's direct view.

As the nurse must make frequent trips from the station to patient's rooms as well as to service loca-

EXHIBIT H
TO REBUTTAL STATEMENT
OF THOMAS LEMONS

IES LIGHTING HANDBOOK

1987 Application Volume

JOHN E. KAUFMAN, PE, FIES
Editor

JACK F. CHRISTENSEN
Associate Editor

Published by
ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA
345 East 47th Street, New York, N. Y. 10017

ISBN 0-87995-024-2
Library of Congress Catalog Card Number: 86-082876

Second printing: February, 1989

PRINTED IN THE UNITED STATES OF AMERICA

by patient or nurse; however, when left on continuously, the luminance produced in the surrounding field of darkness is sometimes a source of annoyance to patients wishing to sleep.

For continuous use, the night-light recommended incorporates a low-brightness luminaire with louvered or refractive cover, flush wall type, installed so that its center is approximately 360 millimeters (14 inches) above the floor to direct a low illuminance along the floor where it is needed for walking or moving about in the room.

The important criterion for night lighting is limiting the source luminance. This luminance should not exceed 70 candelas per square meter (6.5 candelas per square foot) for continuous use, or 200 candelas per square meter (19 candelas per square foot) for a short time.

Examination. The lighting for examining patients in their rooms should be of a color quality that will not distort skin or tissue color, of a directionality to permit careful inspection of surfaces and cavities, and shadowless. When curtains are used to isolate a patient, others in the room are protected from the examining lamp; however, whether fixed or portable, the examination lighting should be confined to the bed area and provide adequate lighting in the center of a circular area 0.6 meter (2 feet) in diameter.

Examination lights are defined as those luminaires used for minor medical procedures outside the operating room. Examples of these procedures would be tissue examination and suture removal. The range of examination/treatment units varies from a simple "gooseneck" lamp to a luminaire having qualities similar to an operating room unit, depending on the complexity and nature of the visual task. The following criteria should be considered when selecting luminaires for examination:

1. *Distance:* adequate illumination should be available at a distance of 1070 millimeters (42 inches). In treatment rooms, the focal length of the luminaire should be compatible with the task to be observed, typically 600 to 910 millimeters (24 to 36 inches).
2. *Radiation:* for patient safety and comfort, the luminaire should be designed with a heat filtration system. At maximum intensity, the lighting unit at a distance of 1060 millimeters (42 inches) from the field should produce no more than 25,000 microwatts per square centimeter in the field.
3. *Color Correction:* the luminaire should provide good color rendition of tissue. Color temperature should be between 3500 and 6700 kelvins.
4. *Mobility:* the unit should move freely and be easily positioned with one hand. Once the luminaire is positioned, the mounting system should permit it to remain stationary without drifting. Articulation of the unit should require 2.3 kilograms [five pounds] or less of force by the user.
5. *Safety:* safety of the user and patient should be addressed by considering (a) surface temperatures of the luminaire, (b) tipping-hazard, (c) electrical safety, and (d) durability of external surfaces. The placement of fixed, flexible arm units should be reviewed carefully, especially with older patients who may reach out to use the arm for support, which it will not provide.

Patient Use. Patient use implies control by the patient for reading, visiting, self-care or viewing television. This control must be limited to

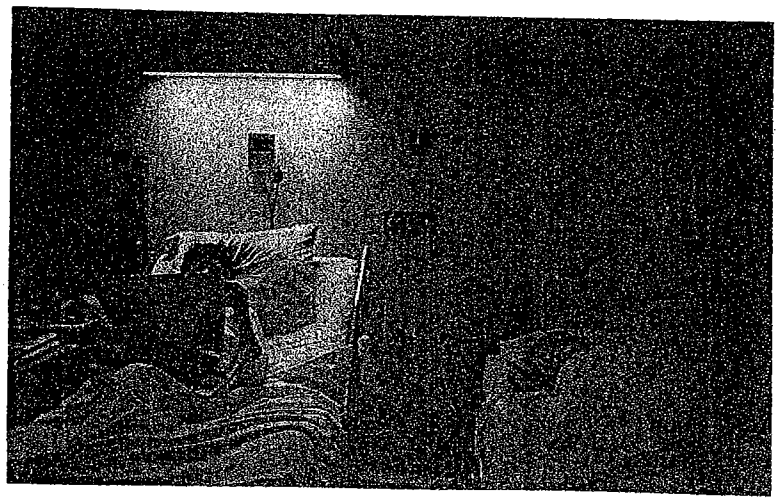


Fig. 7-6. Patient room lighting in multiple occupancy accommodation. Note one patient reading while another sleeps under reduced illumination.

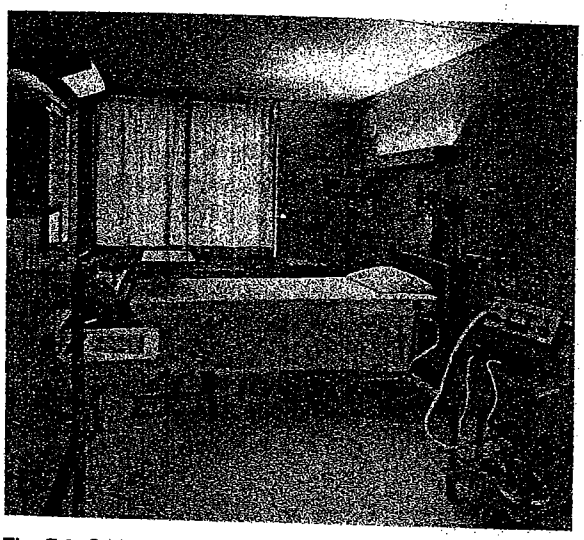


Fig. 7-8. Critical care room. Wall brackets contain two fluorescent lamps for indirect general lighting, one fluorescent lamp as a downlight for reading, and an incandescent night-light for surveillance from the nurses' station. Two 325-watt tungsten halogen lamps in ellipsoidal reflectors are also provided for indirect examination light.

port resuscitation, hemorrhage, or any other anticipated emergency situations which can be anticipated.

The illumination should enable the observer to note (1) changes in contour and color, (2) the prominence of veins on the neck, and (3) the presence of yellow tints in the patients' eyes, if possible. Good color rendering is important so that the patients' complexion will have a true appearance. Thus, only improved color fluorescent lamps should be used. See Fig. 7-8.

While the demands for visual tasks in these units may be great, the well-being of the patient must also be carefully considered in planning. For example, the minimum requirements of construction from the Health Resources Administration (*79-1450*) require the provision of windows to enable *each* patient to be cognizant of the outdoor environment. Yet the provision of illumination by this means is not important.

The general lighting should be capable of being dimmed. It should be located so that neither the prone patient, nor the one sitting with an elevated backrest, will be subjected to glare. In addition to general lighting, there should be lighting for examinations by the physician. Also, some type of surgical task light should be readily available to provide higher illuminances for emergency procedures.

Most of these facilities contain a handwashing area.

The nursing station is usually fully visible to the patient, so that luminaires below the counter or shelf should be shielded.

Monitoring devices (see Fig 7-9) should be studied so that there will be adequate illumination for reading them. This also includes a review of their placement and whether or not they are internally illuminated.

Children's Section (Pediatric). The child admitted to the hospital for the first time may feel dwarfed by its huge size and depressed by the concentration of suffering. Strange equipment may be frightening and may alarm ill patients or intensify anxiety. For this reason the pediatric section or department should be provided with

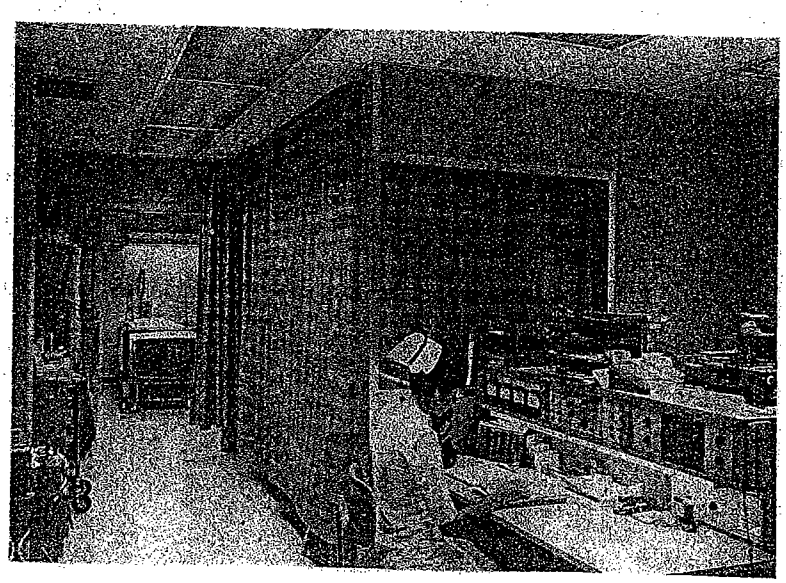


Fig. 7-9. Nursing station in critical care unit. Note the lighting beneath the counter and out of the patient's view. Also, monitoring devices are easily visible.

EXHIBIT K
TO EXPERT DECLARATION
OF THOMAS M. LEMONS

CONFIDENTIAL INFORMATION – TO BE FILED UNDER SEAL
(Subject to Judicial Determination)

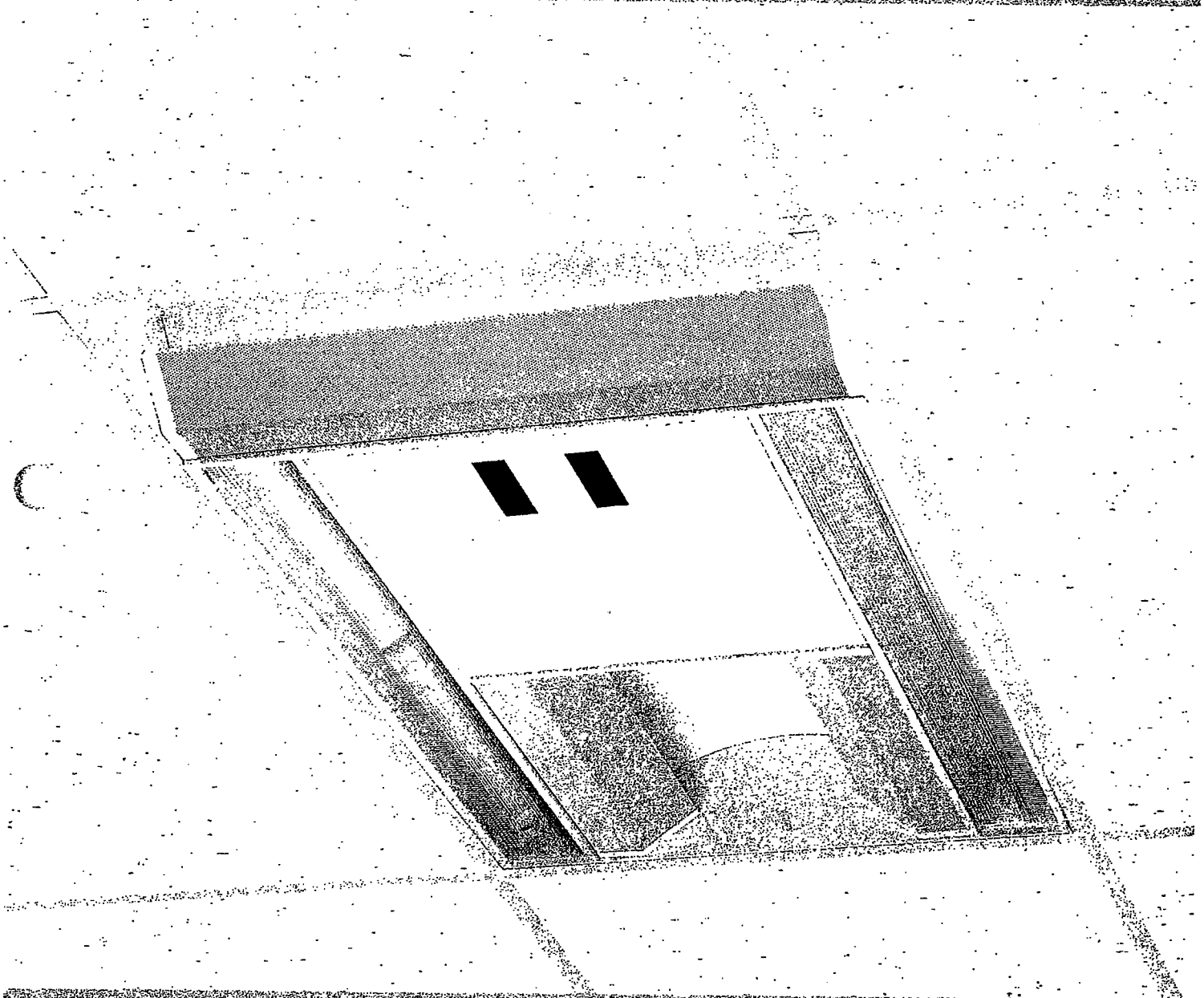
EXHIBIT L
TO EXPERT DECLARATION
OF THOMAS M. LEMONS

CONFIDENTIAL INFORMATION – TO BE FILED UNDER SEAL
(Subject to Judicial Determination)

EXHIBIT O
TO EXPERT DECLARATION
OF THOMAS M. LEMONS

MULTMED

MULTI FUNCTION PATIENT BEDLIGHT



ALS0300

We bring ARCHITECTURE *to* LIGHT!

ALS

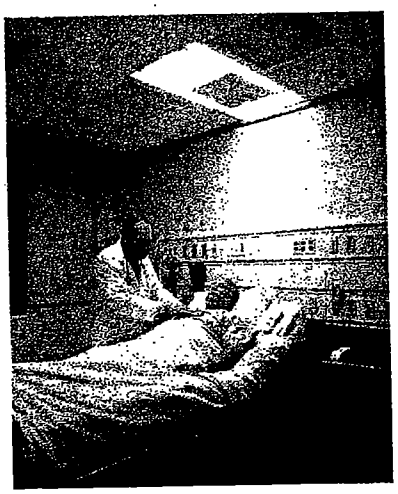
MULTMED

MULTI FUNCTION PATIENT BEDLIGHT

The MULTMED brings a new dimension of performance, versatility and styling to ceiling mounted patient bed lighting. Four high-performance functions including examination, reading, ambient and night/chart lighting are all incorporated into a single unit that mounts unobtrusively over the bed, leaving valuable head-wall space available for other equipment.

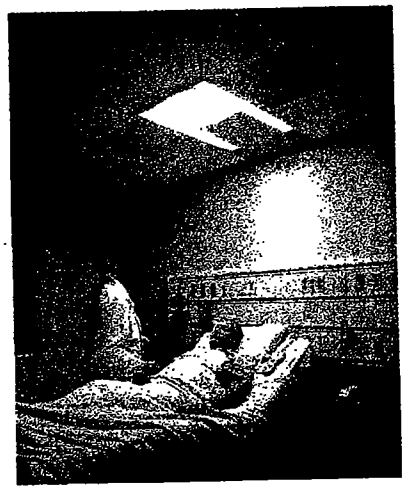
The MULTMED is designed to minimize installation and service time. All models utilize a single lamp type (excluding nurse light), all lamps are easily accessed with one-touch diffuser removal, and all ballasts and switching gear are accessible from the room side within a single centrally located electrical cabinet.

The MULTMED system includes numerous configurations in both 2x2 and 2x4 sizes to suit virtually any application.



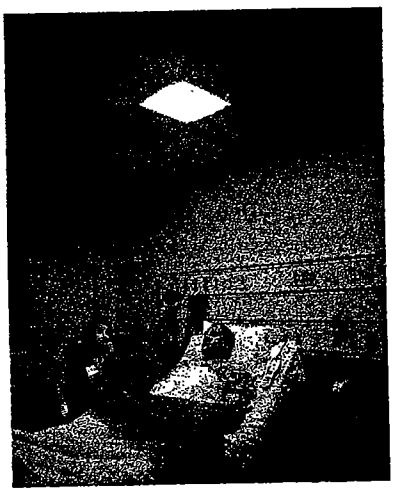
High-Level Lighting

With all lamps illuminated, sufficient glare-free lighting is provided to suit most demanding visual tasks.



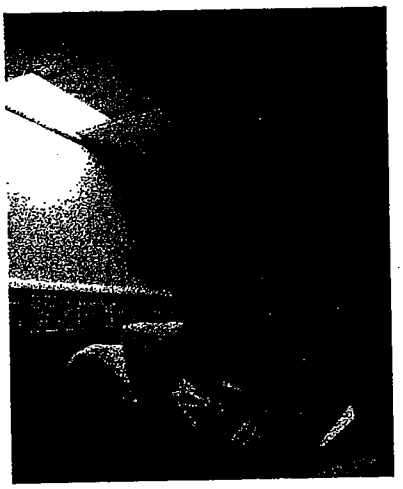
Examination Light

Two crossed beams of asymmetric light ensure shadow-free illumination over the length of the bed, even when the doctor is leaning over the patient.



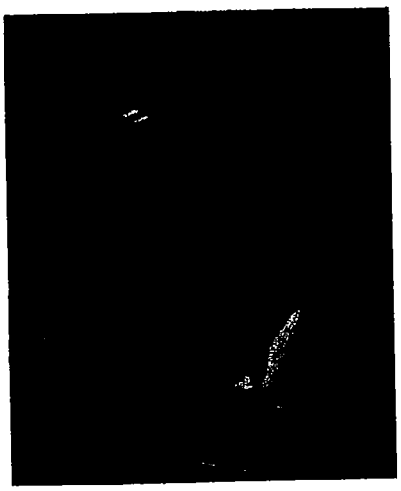
Ambient Light

Provides soft glare-free general illumination while shielding any view of the lamps from either the staff, visitor or patient's perspective.



Reading Light

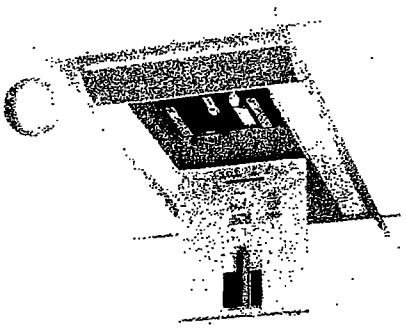
A combination of direct light from the fixture along with reflected light from the head wall provides ample, shadow-free reading light - even when the bed-back is fully elevated.



Nurse/Chart Light

A unique design that allows the patient to rest peacefully while providing staff with a focused beam of light on both sides of the bed. (Light pattern on wall is un-retouched)

ALS0301

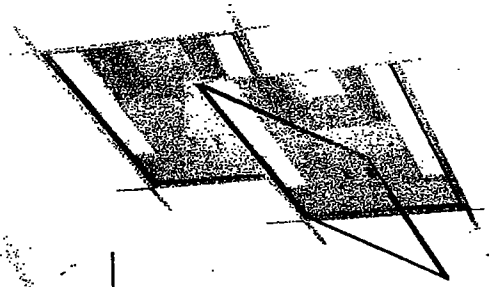


Integral Electrical Cabinet

Installation and servicing are greatly simplified by this exclusive feature which houses all ballasts, relays and other electrical gear. It is fully room-side accessible and no tools are required to open.

Hinged Lamp Diffusers*

Re-lamping takes only seconds with no tools required. Swing-open diffusers can't fall off and are easily re-latched.



Optional Sani-Shield Cover *

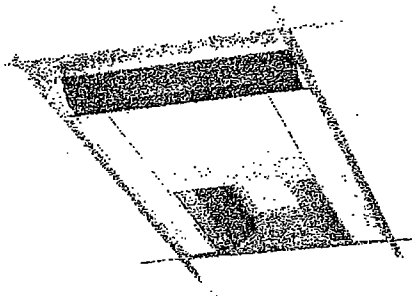
A triple gasketed clear acrylic lens in a hinged frame door fully seals the fixture against dust, insects and other health hazards while minimizing cleaning requirements.

Features

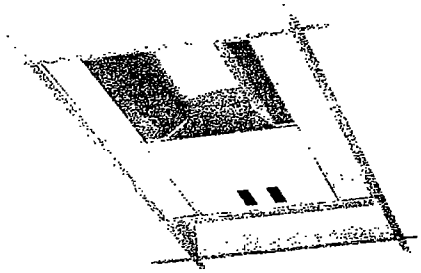
The MULTMED is engineered to minimize both installation and maintenance.

* When the Sani-Shield option is specified, hook-on lamps diffusers are substituted for hinged, swing open diffusers. The physical appearances of both are identical.

ALS



2X4 Model "A" 3-Mode (no nurse light)



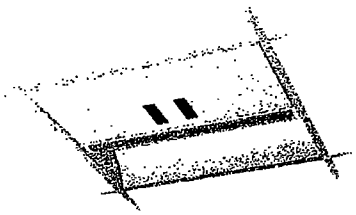
2X4 Model "B" 4-Mode (with nurse light)

2X4 Models

For new construction, or where existing ceilings will permit, MULTMED 2x4 models provide maximum performance with economical cost.

2X2 Model "D" Reading + Ambient

2X2 Model "E" Examination + Ambient



2X2 Model "F" Reading + Nurse Light + Aux. Wiring Cabinet

2X2 Models

Ideal where existing ceilings conditions preclude the use of 2X4 units or where a custom configuration is desired. MULTMED 2X2's can be combined with other 2' by 2' or 2' by 4' lay-in fixture to meet the specific needs of the application or budget.

Shallow Profile

At a mere 5-1/4" in height, MULTMED is more compact than any other recessed bedlight available. This makes it the ideal choice wherever cramped ceiling plenums are in issue. Side entry wiring is also possible.

Ordering Key - 2X4 MODELS

M T 2 - _ _ _ _ _ _ _

- FIXTURE SERIES
- NOMINAL SIZE
- STYLE
- LAMP TYPE
- VOLTAGE
- BALLAST
- MOUNTING
- OPTIONS

FIXTURE SERIES
MT (MUL-T-MED PATIENT BEDLIGHT)

NOMINAL SIZE
2 2x4

STYLE
A 3-MODE (NO NURSE LIGHT)
B 4-MODE

LAMP TYPE
730 (7)F39BX (Style A only)
731 (7)F39BX and (1)PL7 NURSE LIGHT (Style B only)

VOLTAGE
1 120 VOLT
2 277 VOLT
9 SPECIAL*

BALLAST
E ELECTRONIC (Standard) (Except PL7 Nurse Light)
9 SPECIAL*

MOUNTING
1 GRID CEILING MOUNT(Standard)
2 SURFACE MOUNT KIT
3 PLASTER FRAME KIT
9 SPECIAL*

OPTIONS
B EMERGENCY BATTERY PACK (Ambient Section Only)
F FUSING (HLR/GLR STANDARD) (Consult Factory)
THD LESS THAN 10% THD BALLASTS (Consult Factory)
SW LOW VOLTAGE SWITCHING OPTIONS (Consult Factory)
SS SANI-SHIELD COVER
9 SPECIAL (Specify)*

*** Consult factory prior to specification.**

Ordering Key - 2X2 MODELS

M T 1 - _ _ _ _ _ _ _

- FIXTURE SERIES
- NOMINAL SIZE
- STYLE
- LAMP TYPE
- VOLTAGE
- BALLAST
- MOUNTING
- OPTIONS

FIXTURE SERIES
MT (MUL-T-MED PATIENT BEDLIGHT)

NOMINAL SIZE
1 2x2

STYLE
D 2-MODE -AMBIENT & READING
E 2-MODE -AMBIENT & EXAM
F 2-MODE -READING, NURSE LIGHT & AUX. ELEC. COMPARTMENT

LAMP TYPE
330 (3)F39BX (Style D)
340 (3)F40BX (Style D)
350 (3)F55BX (Style D)
430 (4)F39BX (Style E)
440 (4)F40BX (Style E)
450 (4)F55BX (Style E)
630 (6)F39BX (Style E)
640 (6)F40BX (Style E)
650 (6)F55BX (Style E)
130 (1)F39BX AND (1)PL7 NURSE LIGHT(Style F)
140 (1)F40BX AND (1)PL7 NURSE LIGHT(Style F)
150 (1)F55BX AND (1)PL7 NURSE LIGHT(Style F)
999 SPECIAL*(Consult Factory)

VOLTAGE
1 120 VOLT
2 277 VOLT
9 SPECIAL*

BALLAST
E ELECTRONIC (Standard) (Except PL7 Nurse Light)
9 SPECIAL*

MOUNTING
1 GRID CEILING MOUNT(Standard)
2 SURFACE MOUNT KIT
3 PLASTER FRAME KIT
9 SPECIAL*

OPTIONS
B EMERGENCY BATTERY PACK (Ambient Section Only)
F FUSING (HLR/GLR STANDARD) (Consult Factory)
THD LESS THAN 10% THD BALLASTS (Consult Factory)
SW LOW VOLTAGE SWITCHING OPTIONS (Consult Factory)
SS SANI-SHIELD COVER
9 SPECIAL (Specify)*

*** Consult factory prior to specification.**

CONSULT INDIVIDUAL PRODUCT SHEETS FOR COMPLETE PRODUCT SPECIFICATIONS AND PHOTOMETRIC INFORMATION

Patents Pending **www.alslights.com**

ARCHITECTURAL LIGHTING SYSTEMS ALS
30 Sherwood Drive
Taunton, MA 02780
Tel. (508) 823-8277
Fax (508) 822-6787
A DIVISION OF ARCH LIGHTING GROUP INC.

EXHIBIT P
TO EXPERT DECLARATION
OF THOMAS M. LEMONS

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

KENALL MANUFACTURING COMPANY,	)	
Plaintiff/Counter-Defendant,	)	No. 05 C 1138
v.	)	Judge Ruben Castillo
GENLYTE THOMAS GROUP LLC	)	
Defendant/Counter-Plaintiff.	)	

MEMORANDUM OPINION AND ORDER

On February 25, 2005, Kenall Manufacturing Company ("Kenall") filed suit against Genlyte Thomas Group, LLC ("Genlyte") seeking a declaratory judgment that Kenall's products do not infringe upon Genlyte's Patent Number 5,038,254 ("the '254 Patent.") (R. 1, Compl.) On March 4, 2005, Genlyte answered the Complaint and counterclaimed that Kenall infringed on the '254 Patent. (R. 8, Answer & Countercl.) Pursuant to the Court's order, the parties filed a Joint Statement of Claim Language in Dispute ("Joint Statement") on June 30, 2005, stating that they dispute construction of certain phrases in claim 1 of the '254 Patent. (R. 23, Joint Statement.) The Court then ordered briefing by the parties on the proper construction of the disputed terms in accordance with *Markman v. Westview Instruments, Inc.*, 52 F.3d 967 (Fed. Cir. 1995). Kenall filed its Markman statement with the following documents attached: the '254 Patent; U.S. Patent No. 5,086,375; U.S. Patent No. 5,160,193; and U.S. Patent No. 3,928,757. (R. 26, Kenall Markman, Exs. 1-4). Genlyte then filed its Markman statement, attaching the following documents: the '254

Patent; the '254 Patent prosecution history;[1] excerpts from 1987 and 1993 volumes of various lighting handbooks; a "Statement by Thomas M. Lemons, a Person Skilled in the Lighting Arts" ("Lemons Statement"); and excerpts from Webster's Ninth New Collegiate Dictionary. (R. 27, Genlyte Markman, Exs. A-E.)

In Kenall's reply brief, Kenall attached the following additional exhibits: "Statement of William E. Brackett A Person Skilled In Lighting Arts" ("Brackett Statement"); excerpts from the 1943 edition of the Hospital Lighting Data Book; U.S. Patent Number 2,557,129; and technical information sheets on Genlyte's MD*4 lighting system. (R. 28, Kenall Reply, Exs. 1-4.) In response, Genlyte filed a surreply attaching a "Sur-Reply Statement of Thomas M. Lemons" and an excerpt from the 1993 edition of the Lighting Handbook. (R. 31, Genlyte Surreply, Exs. F-G.) Genlyte also filed a motion to strike the statement of William Brackett on January 4, 2006. (R. 32, Mot. to Strike.)

THE '254 PATENT

The '254 Patent describes an integrated ceiling-mounted medical lighting system which includes three individual dedicated light fixtures. (R. 26, Kenall Markman, Ex. 1 ("'254 Patent"), Abstract; and col.1, ll.62-64.) The lighting system is rectangular, and it is designed to be placed near where the wall and the ceiling connect at the head of a patient's hospital bed. ('254 Patent, col.1,

[1]The United States Patent and Trademark Office ("PTO") issued the '254 Patent on the first office action with no substantive changes, so the prosecution history is not helpful to claim construction in this case. (R. 26, Kenall Markman at 3; R. 27, Genlyte Markman at 13.) While Genlyte argues that the lack of prosecution history shows the PTO recognized the pioneering status and broad nature of the '254 Patent, Kenall argues the PTO's quick approval proves the narrow nature of the '254 Patent. (R. 27, Genlyte Markman at 13; R. 28, Kenall Reply at 10.) Neither party, however, has any legal or factual basis for making these arguments, and the Court will not use the absence of prosecution history as an aid to claim construction in this case.

ll.65-68.) These three light fixtures include a reading light, an examination light, and an ambient light. ('254 Patent, Abstract.) The parties dispute the claim language defining the reading and ambient lights, light fixtures 1 and 2.

ANALYSIS

Before proceeding on the issue of infringement, the Court must determine the meaning of any disputed claim language as a matter of law. *Markman*, 52 F.3d at 979. The parties dispute the meaning of the two independent claims of the '254 Patent, claims 1 and 3.[2] The remaining claims are dependent.[3] (R. 26, Kenall Markman at 1; R. 27, Genlyte Markman at 4.) Claim 1 states, in relevant part:

> A medical lighting system comprising: a body; means for ceiling-mounting said body; a first light fixture within said body oriented to direct light downwardly to a selected reading area under said body; a second light fixture within said body oriented to direct light downwardly and outwardly to a vertical wall surface outwardly adjacent from said body whereby light is reflected back to a broad area under said body.

('254 Patent at col.3, ll.37-48.) Although not mentioned in their Joint Statement, the briefs make clear that the parties also dispute the identical language in claim 3.[4] Within claim 1 and 3, the parties

---

[2]In the Joint Statement, the parties also ask the Court to determine whether the first and second light fixtures constitute a "means plus function" element according to 35 U.S.C. § 112 ¶ 6. The parties, however, have not addressed this issue in their briefs. (R. 23, Joint Statement at 1-2.) The Court notes that if the disputed claim term does not use the word "means," there is a presumption that 35 U.S.C. § 112, ¶ 6 does not apply. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1369 (Fed. Cir. 1991).

[3]A claim is "independent" if it stands on its own, and a claim is "dependent" if it refers to another claim in its preamble.

[4]The parties do not dispute the additional language in claim 3: "a third light fixture within said body oriented to direct light downwardly under said body to a selected patient examination area." ('254 Patent at col.4, ll.1-3.)

specifically dispute the meaning of the phrases: "a first light fixture within said body oriented to direct light downwardly to a selected reading area under said body;" and "a second light fixture within said body oriented to direct light downwardly and outwardly to a vertical wall surface outwardly adjacent from said body whereby light is reflected back to a broad area under said body." ('254 Patent at col.3, ll.54-64.) In the Joint Statement, the parties further limited the disputed words to "oriented to direct light" and "outwardly adjacent." However, the parties' briefs show that the two phrases as a whole are in dispute, and the Court will thus consider the disputed phrases in their entirety.

I. Legal Standards

The Federal Circuit mandates that district courts begin their claim construction analysis with the words of the claim, as they define the invention. *Nystrom v. TREX Co., Inc.*, 424 F.3d 1136, 1142 (Fed. Cir. 2005). The words of the claim are generally given their "ordinary and customary meaning," which is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention. *Id.* The Court must then consider the patent specification and the prosecution history, as the person of ordinary skill in the art views the claim term in the light of the entire intrinsic record. *Id.* "The construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction." *Id.* Finally, the Court may look at extrinsic evidence such as dictionaries, treatises, and expert testimony; "[h]owever, undue reliance on extrinsic evidence poses the risk that it will be used to change the meaning of claims in derogation of the indisputable public records consisting of the claims, the specification and the prosecution history, thereby undermining the public notice function of patents." *Id.* at 1143. *See also Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005).

II. First Light Fixture: "oriented to direct light downwardly to a selected reading area under said body."[5]

A. Words of the Claim

In accordance with the standard set out in *Phillips* and reiterated in *Nystrom*, when construing a claim the Court first considers the words of the claim, which "themselves provide substantial guidance as to the meaning of particular claim terms." *Pfizer, Inc. v. Teva Pharm., USA, Inc.*, 429 F.3d 1364, 1373 (Fed. Cir. 2005) (quoting *Phillips*, 415 F.3d at 1314). "In some cases, the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words." *Phillips*, 415 F.3d at 1314. In most cases, however, courts must dig deeper into the meaning of the claim language.

With regard to the first light fixture, Kenall claims that the phrase "oriented to direct light" requires that "the fixture in question be designed to emanate more light toward the designated target than in any other direction." (R. 26, Kenall Markman at 3.) Genlyte counters that "oriented to direct light" simply means "to set or arrange to direct light." (R. 27, Genlyte Markman at 22.) However, when considering the entire disputed, "oriented to direct light *downwardly*," very little difference between the parties' proposed constructions remains. To set or arrange to direct light *downwardly* has the same meaning as to emanate *more light in a downward direction*. This construction is clear on the face of claims 1 and 3. Claim 1 states that the first light fixture is oriented to direct light "downwardly," while the second light fixture is oriented to direct light "downwardly and outwardly."

[5]Although in the Joint Statement, the parties ask the Court to construe the phrase, "selected reading area under said body," neither party addressed this issue in their briefs. (R. 23, Joint Statement at 2.)

Thus, the first light fixture in claim 1 must direct more light downwardly than outwardly; otherwise, the words "and outwardly" would be meaningless. "An interpretation of one claim that renders another claim meaningless is disfavored." *CytoLogix Corp. v. Ventana Med. Sys., Inc.*, 424 F.3d 1168, 1173 (Fed. Cir. 2005).

Genlyte admits that light from lamps of a light fixture can go downwardly, outwardly, and/or upwardly, and the '254 Patent specifies the direction or directions the light goes. (R. 31, Genlyte Surreply at 3.) It follows that a light fixture oriented to direct light downwardly is not oriented to direct light outwardly or upwardly. This distinction would be meaningless without an understanding that "more" light must go downwardly than outwardly or upwardly. Far from reading a quantitative term into the claim or limiting the '254 Patent to its preferred embodiment (R. 27, Genlyte Markman at 15), the modifier "more" follows from the language of the '254 Patent itself. Accordingly, the Court finds the correct construction of the phrase, "oriented to direct light downwardly" to be: "to set or arrange to direct more light in a downward direction than in an upward or outward direction."

B. Intrinsic Record

"The construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction." *Phillips*, 415 F.3d at 1316; *Nystrom*, 424 F.3d at 1142. The intrinsic record consists of the patent specification – the claims and the written description of the patent – and the prosecution history.[6] *Nystrom*, 424 F.3d at 1142. "The specification is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term." *Phillips*, 415 F.3d at

[6]As explained above, the absence of prosecution history for the '254 Patent does not aid the Court in claim construction.

1315 (citations omitted).

The '254 Patent's specification supports the construction that "oriented to direct light downwardly" means that more light is directed in the downward direction than in an upward or outward direction. The same language is used in the undisputed portion of claim 3, which states: "third light fixture within said body oriented to direct light downwardly under said body to a selected patient examination area." ('254 Patent at col.4, ll.1-3.) The light from the third light fixture arranged to direct more light downwardly than upwardly or outwardly so that a selected patient examination area may be highlighted. The written description supports this interpretation, as the "Abstract" states that the reading light -- a.k.a., the "first light fixture" – is "directed toward a selected reading area on a hospital bed directly below the medical lighting system." ('254 Patent.) The first light fixture must be set or arranged to direct more light downward to this "selected reading area" like the "selected patient examination area," to avoid rendering this language meaningless. Likewise, this meaning is bolstered by the "Background of the Invention" section, which states that the reading light "provides direct light to a portion of the patient's bed" ('254 Patent at col.1, ll.14-16), and the "Objects and Summary of the Invention" section of the '254 Patent, which states that the first light fixture is "designed to direct light toward the forward portion of the patient's bed so as to allow the patient to read comfortably." ('254 Patent at col.2, ll.3-6.)

C. Extrinsic Evidence

Extrinsic evidence is all evidence outside the patent and its prosecution history. *Markman*, 52 F.3d at 980. Extrinsic evidence is less significant and less reliable than the intrinsic record in determining the legally operative meaning of claim language. *Phillips*, 415 F.3d at 1317-18. Sources of extrinsic evidence, such as expert testimony, dictionary definitions, technical treatises,

and articles may not be used to vary or contradict a claim's meaning that is unambiguous in light of the intrinsic evidence. *Phillips*, 415 F.3d at 1324 (adhering to and reaffirming the Federal Circuit's approach to claim construction outlined in *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1584 (Fed. Cir. 1996)). Accordingly, the Federal Circuit has found it unnecessary to consider extrinsic evidence where the intrinsic evidence was unambiguous and sufficient to support the claim construction. *See Koepnick Med. & Educ. Research Found., L.L.C. v. Alcon Labs., Inc.*, No. 05-1215, 2005 WL 3543012, at *6 (Fed. Cir. 2005); *Vitronics*, 90 F.3d at 1584 ("[W]here the patent documents are unambiguous, expert testimony regarding the meaning of a claim is entitled to no weight.") Although this Court finds the '254 Patent language unambiguous as shown above, this Court will briefly review the extrinsic evidence in this case, which tends to support this Court's claim construction.

1. Expert Testimony

Expert evidence may be especially unreliable because "expert reports and testimony is generated at the time of and for the purpose of litigation and thus can suffer from bias that is not present in intrinsic evidence." *Phillips*, 415 F.3d at 1318. Genlyte seeks to strike the statement of William Brackett, Kenall's purported expert, first on the grounds that Brackett is not a person of ordinary skill in the art. (R. 32, Mot. to Strike.) In order to determine the value to be accorded to the statements of persons of ordinary skill in the art, the Court must first determine the "relevant art" and the "level of ordinary skill in the art." *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 716 (Fed. Cir. 1991). The "relevant art is defined by the nature of the problem confronting the would-be inventor." *Id.* Genlyte argues that the relevant art is lighting design, or even more specifically, medical lighting design. (R. 32, Genlyte Mot. to Strike at 12-15.) Kenall, on the other hand, claims

that the relevant art is light distribution and measurement or lighting design. (R. 40, Resp. to Mot. to Strike at 10.) Contrary to Genlyte's contention, the relevant art is not limited to medical lighting systems, or even lighting fixture design. Although the inventor of the '254 Patent sought to improve medical lighting systems over patients' beds, the "nature of the problem confronting the would-be inventor" is broader than Genlyte contends: the problem is how to appropriately distribute light from the light fixtures to serve certain stated purposes. Expertise in lighting design, measurement, or distribution would be important to solve this problem. Thus, the relevant art is lighting design, measurement, or distribution. *See Ryko*, 950 F.2d at 718-19.

"The level of ordinary skill in the art" is determined by considering factors such as the educational level of the inventor and those who work in the industry, and the sophistication of the technology involved. *Id.* at 718. Genlyte contends that Brackett does not have the level of ordinary skill in the art when the relevant art is defined as lighting design. (R. 32, Genlyte Mot. to Strike at 12-15.) While it is true that Brackett only has limited experience in the field of lighting design, he has extensive technical experience in the art of lighting measurement and distribution, as this Court has defined the relevant art. Brackett has thirty years experience in the application, testing and analysis of a wide variety of light fixtures. (R. 28, Kenall Reply, Ex. 1 ("Brackett Statement") at 1-2.) In addition, he has published six papers in the *Journal of the Illuminating Engineering Society* dealing with lighting measurements and he served as chair of the Illuminating Engineering Society of North American ("IESNA") Technical Knowledge Exam Committee. (*Id.*) Thus, Brackett qualifies as one of ordinary skill in the art.

Genlyte also argues that Brackett's Statement should be stricken on the grounds that it was largely ghost-written by Kenall counsel. (R. 32, Motion to Strike at 1.) Federal Rule of Civil

Procedure 26 requires an expert's report to be "prepared and signed by the witness." Fed. R. Civ. P. 26. Although Rule 26 does not prohibit a party's attorney from providing assistance to the expert, "[p]reparation implies [an expert's] involvement other than perusing a report drafted by someone else and signing one's name at the bottom to signify agreement." *Manning v. Crockett*, No. 95 C 3117, 1999 WL 342715, at *3 (N.D. Ill. May 18, 1999). Genlyte points primarily to Brackett's October 11, 2005 deposition testimony to show that Kenall counsel in essence drafted the Brackett Statement. (R. 32, Mot. to Strike at 3-8.) At his deposition, Brackett did not remember and showed some uncertainty about the details of the preparation of his Statement. (R. 32, Mot. to Strike at 3-8; R. 44, Reply to Mot. to Strike at 5-7). In response to Genlyte's motion to strike, Kenall provided evidence that Brackett's statement was indeed drawn from Brackett's opinion and not from Kenall's attorney. Kenall attached to its response: (1) eight pages of Brackett's notes about the '254 Patent (R. 40, Resp. to Mot. to Strike, Ex. 1); (2) a declaration by Brackett stating that (a) Kenall's attorney, Matthew Fannin, spoke with Brackett for one and a half hours before Fannin drafted a report of Brackett's opinion, (b) Brackett spent three hours reviewing and editing this draft "to ensure it was a complete representation of my opinion," and (c) the next day Brackett requested further changes be made until "the Statement represented the opinion [he] wanted to put forth" (R. 40, Resp. to Mot. to Strike, Ex. 2); and (3) e-mail correspondence with attachments of various forms of the Brackett Statement after edits by Brackett and Fannin (R. 40, Resp. to Mot. to Strike, Exs. 3-4). After considering Brackett's deposition testimony, the drafts of Brackett's Statement, Brackett's declaration, and the e-mails, "the [C]ourt cannot exclude the possibility that the [brief] was drawn from [Brackett's] opinions rather than the other way around." *Solaia Tech. LLC v. ArvinMeritor, Inc.*, 361 F. Supp. 2d 797, 805 (N.D. Ill. 2005). Therefore, Genlyte's motion to strike is denied. (R.

32.)

a. Brackett Statement

Although the Court declines to strike Brackett's Statement, it nevertheless has very little probative value. "[C]onclusory, unsupported assertions by experts as to the definition of a claim term are not useful to a court." *Phillips*, 415 F.3d at 1318 (citations and quotations omitted); *see also Invitrogen Corp. v. Clontech Labs., Inc.*, 429 F.3d 1052, 1068 (Fed. Cir. 2005). Brackett's Statement consists almost entirely of conclusory, unsupported assertions. Although Brackett states that he reviewed several patents, the IESNA Handbook, and the parties' Markman statements, he does not once reference any of these or other materials in support of his seven-page opinion of the correct construction of claims 1 and 3 of the '254 Patent. (*See* Brackett Statement.) Rather, Brackett sets forth his opinion without any support for it. Therefore, this Court accords very little value to Brackett's Statement.

b. Lemons

In contrast, the conclusions of Genlyte's expert, Thomas Lemons, are generally well-supported by lighting handbooks and other primary materials,[7] and, in fact, support the Court's construction of the phrase "oriented to direct light downwardly." Lemons defined this phrase as "to set or arrange to direct illumination to an area below the product." (Lemons Statement at 2.) Lemons' response to Brackett's Statement shows that he believes more illumination must be directed below the product than above. In his surreply, Lemons states that Brackett does not identify the "certain direction" where the fixture "emanates more light." (R. 31, Genlyte Surreply, Ex. F ("Lemons Surreply") at 4.) However, Lemons agreed that "[i]f the 'certain direction' is down and

[7]Kenall does not dispute that Lemons is a person of ordinary skill in the art.

the other direction is up then I can accept that [Brackett] understands the use of these terms." (*Id.*)

2. **Dictionaries and Treatises**

"Within the class of extrinsic evidence, the court has observed that dictionaries, especially technical ones, and treatises can be useful in claim construction." *Phillips*, 415 F.3d at 1318. They may not, however, be used to construe a claim "divorced from the context of the written description and prosecution history." *Nystrom*, 424 F.3d at 1144-45. Both parties have attached excerpts from the IESNA Lighting Handbook, the Hospital Lighting Data Book, and Webster's Ninth New Collegiate Dictionary; however, most of these excerpts do not shed light on the disputed claims in this case. This evidence primarily goes to the issue of whether a certain construction of the '254 Patent claims would render the '254 Patent invalid in light of the prior art.[8] Only the definition of "orient" in Webster's Ninth New Collegiate Dictionary 832 (1987), relates directly to claim construction in this case. Webster's defines "orient" as "to set or arrange in any determinate position esp. in relation to the points of the compass." (R. 27, Genlyte Markman, Ex. D). This definition, referring to a "determinate position" in relation to points of the compass, supports this Court's construction that the first light fixture sets or arranges more light in a downward direction than in any other direction. Another construction would render the term "determinate" pointless.

3. **Patent Numbers 5,086,375 and 5,160,193 and 3,928,757**

Kenall argues that the '254 patent is the "parent application" for two continuation-in-part patent applications, Patent No. 5,086,375 ("the '375 Patent) and Patent No. 5,160,193 ("the '193 Patent"), and that these patents should be considered relevant intrinsic evidence in construing the

[8]The issue of invalidity is generally not relevant when construing unambiguous claims. *See infra*, section 4, "Invalidity."

'254 Patent claims. (R. 26, Kenall Markman at 8, Exs. 2 and 3.) A separate patent, however, even if it is a continuation-in-part patent application, does not constitute relevant intrinsic evidence for the '254 Patent. *See Goldenberg v. Cytogen, Inc.*, 373 F.3d 1158, 1167 (Fed. Cir. 2004) (while first patent cited in the prosecution history was part of intrinsic record, second patent created as a continuation-in-part of the original patent was new matter that at most constituted extrinsic evidence). In addition, the '375 and '193 Patents have little value as extrinsic evidence, as there is no proof that use of the phrase "oriented to direct light" in the '375 and '193 Patents has the same construction as in the '254 Patent, where the '375 and '193 Patents deal with a "light fixture module" rather than a "light fixture." (R. 26, Kenall Markman at 8, Exs. 2 and 3.)

Kenall also argues that Patent No. 3,928,757 ("the '757 Patent") is relevant extrinsic evidence, and Kenall asks the Court to determine that the word "directs" in the '254 Patent has the same meaning as in the '757 Patent. (R. 26, Kenall Markman at 11.) The '757 Patent, unlike the '254 Patent, however, deals with a spotlight, and there is no evidence that the term "directs" is used in the same way in both patents. (R. 26, Kenall Markman, Ex. 4.)

4. Invalidity

Kenall also claims that the Court should not adopt the claim construction proposed by Genlyte because if such a construction were adopted the claims would be invalid.[9] (R. 28, Kenall Reply at 5.) While claims should be construed to preserve their validity, validity analysis is not a

---

[9]Kenall also claims that Genlyte's proposed construction would exclude Genlyte's commercial embodiment of the '254 Patent, specifically the MD*4 lighting systems. (R. 28, Kenall Reply at 12-13.) A commercial embodiment, like the preferred embodiment, should not limit the claims of a patent. *Callicrate v. Wadsworth Mfg., Inc.*, 427 F.3d 1361, 1368 (Fed. Cir. 2005). Moreover, the MD*4 information sheets' statement that direct glare is eliminated does not mean that no light shines directly beneath the light. (See R. 31, Genlyte Surreply at 6-7.)

regular component of claim construction. *Phillips*, 415 F.3d at 1327 (citations and quotations omitted). Instead, this maxim is limited to cases in which "the court concludes, after applying all the available tools of claim construction, that the claim is still ambiguous." *Id.* (citations and quotations omitted). *See also Free Motion Fitness, Inc. v. Cybex Intern., Inc.*, 423 F.3d 1343, 1349 (Fed. Cir. 2005) (rejecting party's request to construe claims to preserve their validity because claim was not ambiguous). As this Court has already ruled, the claims are not ambiguous in light of the words of the claims themselves and the intrinsic record.

III. Second Light Fixture: "oriented to direct light downwardly and outwardly to a vertical wall surface outwardly adjacent from said body whereby light is reflected back to a broad area under said body."

A. "Vertical wall surface outwardly adjacent from said body whereby light is reflected back to a broad area under said body"[10]

Kenall claims that with regard to the second light fixture, "outwardly adjacent" refers to "the vertical wall surface closest to the body of the lighting system." (R. 26, Kenall Markman at 3.) Genlyte argues, however, that "outwardly adjacent" merely means "next to or near." (R. 27, Genlyte Markman at 2.) While Kenall's proposed construction goes too far, Genlyte's does not go far enough.

1. Intrinsic Record

"Outwardly adjacent" must mean more than "next to or near," because to decide otherwise would render the term "outwardly" meaningless. "When different words or phrases are used in separate claims, a difference in meaning is presumed." *Nystrom*, 424 F.3d at 1143; *see also*

[10]Although in the Joint Statement, the parties ask the Court to construe the phrase, "whereby light is reflected back to a broad area under said body," neither party addressed this issue in their briefs. (R. 23, Joint Statement at 1.)

Georgia-Pacific Corp. v. United States Gypsum Co., 195 F.3d 1322, 1331 (Fed. Cir. 1999) ("Unless the patent otherwise provides, a claim term cannot be given a different meaning in the various claims of the same patent"). The term "adjacent" is found several times within the claims of the '254 Patent, in addition to claims 1 and 3. Dependent claim 9 states that:

> The medical lighting system of claim 5[11] . . . wherein said second fluorescent light fixture is *inwardly adjacent* to said first fluorescent light fixture and said second fluorescent light fixture is parallel to first shorter end; and wherein said third fluorescent light fixture is *outwardly adjacent* from said second fluorescent light fixture and abuts a second shorter end of said body . . .

('254 Patent, col. 4, ll.24-37) (emphasis added). In contrast to claim 9, claim 14 refers to the term "adjacent" on its own: "The medical lighting system of claim 3 wherein a distribution of light from said first and second light fixtures excludes glare from areas *adjacent* to a standard hospital bed placed below the medical lighting system." ('254 Patent, col.4, ll.60-64) (emphasis added).

Claim 9 provides valuable insight into the meaning of the phrase "outwardly adjacent," as it is used together with the phrase "inwardly adjacent." The second light fixture is "inwardly adjacent to" the first light fixture, and the third light fixture is "outwardly adjacent from" the second light fixture and "abuts a second shorter end of said body." ('254 Patent, col. 4, ll.24-37.) Claim 9 further explains that "said body is rectangular and a first shorter end [sic] of said body is designed to abut the vertical wall surface," and the first light fixture abuts this first shorter end. ('254 Patent, col.4, ll.25-28.) This language plainly states that the first light fixture (the reading light) is closest to the vertical wall surface, as it "abuts" the wall surface. Therefore, the second light fixture (the ambient light), which is "inwardly adjacent" to the first light fixture, must be further from the

[11]Claim 5 involves "[t]he medical lighting system of claim 4," which involves "[t]he medical lighting system of claim 3."

vertical wall surface. It follows that the third light fixture, which is "outwardly adjacent from" the second light fixture, is even further away from the vertical wall surface, since the first light fixture abuts the wall.

The written description of Figure 1, which is described as a "Preferred Embodiment" of the '254 Patent ('254 Patent, col.2, ll.27-28), supports the Court's construction of the terms in claim 9.[12] Figure 1 is a diagram of the ceiling mounted structure. The description of Figure 1 states that: "[a]mbient light reflector 24 is inwardly adjacent to reading light reflector 20" ('254 Patent, col.2, l.50); and "[e]xamination light reflector 28 is outwardly adjacent to ambient light reflector 24, includes short side 18 and is opposite from reading light reflector 20." ('254 Patent col.2, ll.66-67.) In the preferred embodiment figure, reading light reflector 20 is at the end of the ceiling mounted body that is closest to the wall. ('254 Patent, Fig. 1.) Ambient light reflector 24 is closer to the center of the ceiling mounted body, further away from the wall. ('254 Patent, Fig. 1.) Examination light reflector 28 is even further away from the wall, and thus further from the center of the ceiling mounted body. ('254 Patent, Fig. 1.)

The language in claim 9 and the written description of Figure 1 shows that "a vertical wall surface outwardly adjacent from said body" does not necessarily mean "the vertical wall surface closest to the body of the lighting system," as in both cases, the "outwardly adjacent" light fixture or reflector was the furthest from the vertical wall surface abutting the body of the lighting system. In addition, the"inwardly adjacent" light fixture or reflector in both cases is closest to the center of

[12]While Figure 1 is described as a "side plan view of lighting fixture 10" ('254 Patent, col.2, l.32), the '254 Patent only contains claims for a light fixtures 1, 2, and 3. As Figure 1 is the preferred embodiment of the '254 Patent, "lighting fixture 10" must be the ceiling mounted body of the preferred embodiment of the medical lighting system at issue.

the ceiling mounted body. It follows that "inwardly adjacent" to a vertical wall would be the vertical wall closest to the center of the ceiling mounted body; that is, any vertical wall that is adjacent to the horizontal side of the ceiling mounted body, but not the ends of said body.

Moreover, claim 9 shows that the '254 Patent refers to the vertical wall surface closest to the body of the lighting system as "designed to *abut* the vertical wall surface" ('254 Patent, col.4, l.26) (emphasis added) or in claim 12 as "*substantially abutting* the vertical wall surface." ('254 Patent, col.4, ll.53-54) (emphasis added). Thus, the Court finds that the '254 Patent's claims and written description show that the meaning of the phrase, "a vertical wall surface outwardly adjacent from said body," is: "a vertical wall surface next to or near either end of said body."

2. Extrinsic Record

a. Expert Reports

This Court's construction of the phrase "a vertical wall surface outwardly adjacent from said body" aligns with Lemons' original opinion that the phrase means "the wall is next to or near one end of the housing." (R. 27, Genlyte Markman, Ex. C at 2.) Interestingly, in stating its proposed construction, Genlyte dropped the second part of the phrase, "one end of the housing," arguing that "outwardly adjacent" should simply mean "next to or near." (R. 27, Genlyte Markman at 20-22.)

b. Dictionary Definitions

Genlyte points to the Webster's Dictionary definition of "adjacent," which is "not distant: nearby." (R. 27, Genlyte Markman at 21, Ex. D at 56). As explained above, the Court agrees with this construction of "adjacent;" however, Genlyte omits any definition or discussion of "outwardly," which is a key modifier in this phrase. *See also Free Motion*, 423 F.3d at 1349 (upholding district court's construction of "adjacent" as meaning "near").

B. "Oriented to direct light downwardly and outwardly"

In their Joint Statement, the parties originally agreed that the phrase "oriented to direct light downwardly," as used twice in claim 1 and 3, was the only phrase in dispute. (R. 23, Joint Statement at 1-2.) In their briefs, however, the parties realized that the phrase, "oriented to direct light downwardly" ('254 Patent, col.3, ll.40-41), was only used once in the claims, to describe the first light fixture, and a different phrase, "oriented to direct light downwardly and outwardly," was used to describe the second light fixture. ('254 Patent, col.3, ll.43-44.) The parties dispute the construction of both of these phrases. Thus, the Court separately addresses construction of the phrase "oriented to direct light downwardly and outwardly" below.

1. Intrinsic Record

Kenall asks the Court to construe the phrase "downwardly and outwardly" to mean a single intended directionality of light from the second light fixture, specifically, "the single direction of the focus of the light toward the wall." (R. 28, Kenall Reply at 14.) By contrast, Genlyte argues that the phrase "downwardly and outwardly" means "below and away from center (of the light fixture)." This Court agrees with Genlyte that the plain language of the claim shows that the light is oriented in more than one direction – both downwardly and outwardly, but this Court declines Genlyte's invitation to deviate from this Court's previous claim constructions.

There is no support in the '254 Patent, the extrinsic evidence, or common sense for Kenall's argument that downwardly *and* outwardly means only one direction: outwardly, toward the wall. The words of the claim plainly state that the light has more than one intended directionality: downwardly *and* outwardly. To hold otherwise would render the terms "and outwardly" meaningless. In the first section of claim 1, the '254 Patent describes a light that is oriented only

"downwardly," as opposed to both "downwardly and outwardly." ('254 Patent, col.3, ll, 40-44.) Contrary to Kenall's claims, the fact that the second light fixture is directed to a vertical wall and reflected from there to a broad area under the body, does not mean that "all" of the light goes toward the vertical wall and no light travels directly downward. The phrase "oriented to direct light downwardly and outwardly" means "to set or arrange to direct more light in a downward and outward direction than in an upward direction."

2. Extrinsic Record

a. Expert Report

In his initial statement, Lemons broke apart the phrase "oriented to direct light downwardly and outwardly," defining "oriented to direct light downwardly" as "to set or arrange to direct illumination to an area below the product." (Lemons Statement at 2.) Lemons then defined "and outwardly to a vertical wall surface" as "also aims illumination towards the wall." (*Id.*) In his surreply statement, Lemons slightly altered this definition to: "(oriented to direct light) below and away from center [of fixture] (to a vertical wall surface)." (Lemons Surreply at 6.) Lemons explains that "downwardly and outwardly" does not mean the light is separated in two separate directions, but that light will also travel below the lighting system without first being reflected off the vertical wall. (R. 31, Genlyte Surreply at 3; Lemons Surreply at 2-6.) This explanation accords with this Court's construction.

b. Other extrinsic evidence

In its reply, Kenall attached a copy of technical information sheets for MD*4 lighting systems sold by Genlyte. (R. 28, Kenall Reply, Ex. 4). Not only is this evidence of very little probative value, but it does not show that the second light fixture directs all light toward a vertical wall. (R.

28, Kenall Reply at 13.)

IV. Is the "medical lighting system" phrase in the preamble a claim limitation?

Lastly, Kenall argues that this Court should determine that the preamble,"medical lighting system," used to introduce claims 1 and 3, is not a claim limitation and should be given no weight. (R. 26, Kenall Markman at 13, citing '254 Patent, col.3, ll.37, 48.) "A preamble may provide context for claim construction." *Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings*, 370 F.3d 1354, 1362 (Fed. Cir. 2004). However, "preambles describing the use of an invention generally do not limit the claims because the patentability of apparatus or composition claims depends on the claimed structure, not on the use or purpose of that structure." *Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 809 (Fed. Cir. 2002). Kenall argues that the claims of the '254 Patent are structurally complete without the preamble, and thus the preamble only states a purpose or intended use for the invention. (R. 26, Kenall Markman at 13, citing *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997)). Genlyte agrees that the preamble, "medical lighting system," does not supply meaning to any term, but is only "an introductory phrase that sets forth the purpose of the invention." (R. 27, Genlyte Markman at 21.) The Court agrees with both parties that the introductory term, or preamble, "medical lighting system" is not a claim limitation.

CONCLUSION

The Court thus construes the disputed claims as follows: (1) "oriented to direct light downwardly" means "to set or arrange to direct more light in a downward direction than in an upward or outward direction;" (2) "a vertical wall surface outwardly adjacent from said body" means "a vertical wall surface next to or near either end of said body;" and (3) "oriented to direct light downwardly and outwardly" means "to set or arrange to direct more light in a downward and

outward direction than in an upward direction." (R. 26, 27, Markman statements, and R. 32, Motion to Strike.)

ENTERED: _____

Judge Ruben Castillo
United States District Court

Dated: February 2, 2006

EXHIBIT Q
TO EXPERT DECLARATION
OF THOMAS M. LEMONS

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MASSACHUSETTS

Civil Action
No. 05-10945-WGY

* *

GENLYTE THOMAS GROUP LLC,

Plaintiff/Counterclaim Defendant,

v. MARKMAN HEARING

ARCHITECTURAL LIGHTING SYSTEMS,
a division of ARCH LIGHTING GROUP,

Defendant/Counterclaimant.

* *

BEFORE: The Honorable William G. Young,
District Judge

APPEARANCES:

CESARI and MCKENNA, LLP (By Kevin Gannon, Esq.), 88 Black Falcon Avenue, Boston, Massachusetts 02210
- and -
MIDDLETON REUTLINGER (By James R. Higgins, Jr., Esq.), 2500 Brown & Williamson Tower, Louisville, Kentucky 40202-3410, on behalf of the Plaintiff/Counterclaim Defendant

LAW OFFICE OF BRETT N. DORNY (By Brett N. Dorny, Esq.), 386 West Main Street, Suite 12A, Northborough, Massachusetts 01532, on behalf of Defendant/Counterclaimant

1 Courthouse Way
Boston, Massachusetts

June 30, 2006

THE CLERK: All rise. This Court is now in session. You may be seated.

This is Civil Action No. 05-10945, Genlyte Thomas Group, LLC v. Architectural Lighting Systems.

Will the parties please stand and state their names for the Court.

MR. GANNON: Good morning, your Honor. Kevin Gannon, Cesari & McKenna, for Genlyte Thomas Group. And with me is Jim Higgins from Middleton Reutlinger.

MR. HIGGINS: Good morning, your Honor.

THE COURT: Good morning.

MR. DORNY: Brett Dorny for the defendant, Arch Lighting Systems.

THE COURT: Well, good morning and thank you for attending on this session of the Court.

I have a question to begin, and maybe I either misheard or I didn't follow this out. Counsel for Genlyte was kind enough to make mention of a case apparently involving it but some other party in the Northern District of Ohio -- Illinois. Have I got that right?

MR. HIGGINS: Yes, sir.

THE COURT: And in that case the chief out there held a Markman hearing.

MR. HIGGINS: Correct, your Honor.

THE COURT: And some of these same terms were

construed.

MR. HIGGINS: Also correct.

THE COURT: Well, all right, then I'm, then I'm hearing right.

Have you got something that tells me what he did?

MR. HIGGINS: I have a copy of his opinion and I thought that we had tendered that to the Court. But --

THE COURT: I don't say you have not. I'm just always transparent. I haven't read it. So why don't you hand up a copy so I can take a look at it.

MR. HIGGINS: I have a copy. I do want to make note that there are some highlightings on there that are mine.

THE COURT: I have no problem with that. I mean, we'll show it to other --

MR. DORNY: I have no problem with your highlightings.

THE COURT: Yes.

MR. HIGGINS: Very well.

THE COURT: Okay.

MR. HIGGINS: Yes. And, your Honor, we also have some materials that we may refer to during the hearing today. I would like to hand those up at an appropriate time as well.

THE COURT: Why don't you do it right now.

MR. HIGGINS: Very well, sir.

This is a copy of Judge Castillo's opinion from the United States District Court for the Northern District of Illinois Eastern Division. And here are two copies of our Markman materials. I've given a copy to counsel.

THE COURT: Fine.

All right. Well, as I understand this, and you people have been very helpful, we've got three potential terms to construe this morning. I want to skip for the moment the reference to means for ceiling-mounting said body, and instead I want to jump to the term oriented to direct light. And I see the proposed terms here.

Let me -- well, let me ask this. Is that term, these specific oriented to direct light, is that construed in Judge Castillo's opinion, and if so, where?

MR. HIGGINS: Yes, your Honor, it is construed. I may have highlighted it. If you'll hand it back to me I can find it quickly.

THE COURT: Yes, that's the fastest way.

(Pause in proceedings.)

MR. HIGGINS: Your Honor, may I show it to counsel first and then you?

THE COURT: Sure.

(Whereupon counsel conferred.)

MR. DORNY: That's fine. That's one of several

different places where he construes that term.

THE COURT: But doesn't he do it the same way each time?

MR. HIGGINS: Yes.

MR. DORNY: Yes.

THE COURT: You both agree to that. All right.

MR. HIGGINS: Right.

THE COURT: Yes. Then let me see one.

MR. HIGGINS: It's the top paragraph on Page 19, your Honor.

THE COURT: Thank you.

Well, this actually covers both. Because if I look at claim 1 here the first reference is oriented to direct light downwardly, and the second reference is oriented to direct light downwardly and outwardly, and downwardly and outwardly is one of the things that you've asked to have construed. And he comes up with to set or arrange to direct more light in a downward and outward direction than in an upward direction.

And you're okay with that? Genlyte's okay with that, in this proceeding?

MR. HIGGINS: That is correct, your Honor.

THE COURT: And you're not. And you're not in any way bound. Or are you? Are you fine with that?

MR. DORNY: I think that there needs to be some

clarification in terms of what the claims talk about.

THE COURT: I'll hear you.

MR. DORNY: And specifically, with regard to the downward and outward, or downwardly and outwardly as referring to two directions it appears there, I believe the claim refers to a single downward and outward direction to a wall, which is not discussed in that decision, your Honor. It is the part of the claim that refers to what I call the target area for the light. So the light says in the claim oriented to direct light downwardly to a reading area, or downwardly and outwardly to a wall adjacent to --

THE COURT: Yes.

MR. DORNY: -- the, to the fixture. That structure is not discussed in that there's a direction as well as a target.

THE COURT: But where they have a target it states it. It states, and the words seem plain, it's either going to direct the light downwardly to a selected reading area or, and then, not or, there's a --

MR. DORNY: A semicolon.

THE COURT: -- semicolon, a second light feature -- fixture, oriented to direct the light downwardly and outwardly to a vertical wall surface.

I don't have to -- that seems obvious to me. One is the reading area and one's a vertical light surface.

MR. DORNY: Right.

THE COURT: My only -- I don't have a quarrel with Judge Castillo. This all looks very -- well, then what's, what's the matter with his construction of these terms in this context? Oriented to -- it means to set or arrange to direct more light in a downward and outward direction than in an upward direction.

MR. DORNY: As long as your Honor understands, I think that the issue I had with the way that Judge Castillo had worded that was light going downward from the fixture will actually not hit the wall. So saying it's going downward and outward versus upward is the one concern I had with that. As long as you're going downward and outward, which I think your Honor understands that hits the wall, I have no problem with that language at all.

THE COURT: Well, this is, this is a jury claim.

MR. DORNY: Right.

THE COURT: So we have to understand it, and I think the best way to understand it is with reference to the points on a compass. To me if this is a compass, or the degrees of a circle are arranged vertically, downward is anything more than between 90 degrees and 270 degrees. That's downward. Between 270 degrees and 90 degrees is upward. And on those specific degrees it might be outward, but it's not downward. So I've heard --

MR. DORNY: I have a problem with more light upward --

THE COURT: Outward means -- I'm just giving you my -- in case we have to get into this with a jury. Outward is anything other than 180 degrees. But the whole idea is to have it hit a wall, at least in that phraseology, so that it reflects back more broadly, where the first fixture is directed at your reading surface, the newspaper, the book.

MR. DORNY: That's fine, your Honor. I have no problem with the difference being -- the only difference then between what he said and what defendant had put forth was more light versus highest intensity light. And I have no problem with more light. I think that those are equivalent statements.

THE COURT: They're content with that.

I have to -- I don't quarrel with Judge Castillo and it's good to stick with defined rather than have various constructions in various cases. I do want to explain, since he, it's somewhat tautological, he uses the same words where I thought you were supposed to substitute a word. I construe the word direct in this context as equivalent to aim. And if there's any problem with the jury, I'll explain it. It's set or arrange to aim more light. And then downward and outward is, the way I would say, a direction below and away. But I've defined it in terms of actual

degrees and that seems to be logical. I'm going to stick with Judge Castillo's construction now of these terms with which you're all content, but if the jury has any confusion, I will amplify as I just said.

Any problem with any of that? We'll start with Genlyte.

MR. HIGGINS: So far no, your Honor. Except I would, in the materials I would ask you to absorb slide 26.

THE COURT: Thank you. Just a moment. I have it.

MR. HIGGINS: This addresses your degrees on a compass discussion that you had a moment ago.

THE COURT: It does, indeed.

MR. HIGGINS: And this is supported by the statement of our expert, Mr. Lemons, who has a declaration.

THE COURT: But it's too detailed. You didn't say that.

MR. HIGGINS: Right.

THE COURT: Where you say downward -- the first time you use it it's downwardly. So, downward is different than upward. And now we're really talking about broad on the beam or something, you know. Three points half the starboard bow. We're not getting into any of that stuff. Down is different than up. Out is different than vertical.

MR. HIGGINS: We don't disagree with that.

THE COURT: Fine. I'm not getting any more

detailed than that, because, because I go beyond the claim language.

Now, let's talk about --

MR. HIGGINS: Your Honor, may I, may I add one more point, please?

THE COURT: Sure.

MR. HIGGINS: A couple more points. If you look at slide 27.

THE COURT: Yes.

MR. HIGGINS: This slide depicts -- and this is a reference from the IESNA, I E S N A, Illuminating Society of North America Handbook, which is kind of the Bible that lighting designers use, and this discusses the concept that light by itself does not have directionality. Light is generally issued or emanates from a lamp source, a light source, in a 360 degree volume of light. And if you would refer to --

THE COURT: I don't know that I differ with this, but why -- you didn't ask me to construe anything here.

MR. HIGGINS: That's correct, your Honor. This is tutorial.

THE COURT: I don't know that I need it.

MR. HIGGINS: All right.

THE COURT: Let's go, let's go --

MR. HIGGINS: The next one --

THE COURT: Let's do the work.

MR. HIGGINS: Yes, the next one that I would like to point to you is slide 28.

THE COURT: Yes. I guess I don't understand something here. This is a Markman hearing. I didn't think I needed a tutorial. I'll read all this with great care. But I'm not putting any additional gloss on the language beyond what we've agreed to. It's adequate for this morning. Adequate to start the case for the jury. This is not a time to make speeches about tutorials. We'll get on to what does concern me. And that is means for ceiling-mounting said body.

Now, as to this, this is a means-plus-function claim. Right?

MR. HIGGINS: We agree, your Honor.

THE COURT: All right. And, therefore, on this one isn't Architectural Lighting Systems right. That because -- I really don't understand this because you're -- well, it may be in view of anticipation or obviousness or something. But it sounds to me they're right. I don't see why I, where there's no defined structure, why should I now be defining a structure. The patent calls out a means. Any means will do. A means for ceiling-mounting the body.

And let me stick with ALS, let me see if I understand this. As to this if I just say, well, a means is

a means, to perform the function, to get it up there on the ceiling.

MR. DORNY: No, your Honor, that's the whole point of a means-plus-function claim.

THE COURT: Go ahead.

MR. DORNY: Because the statute says and it's understood that the way you have to interpret that claim is determine the function and then you have to determine the structures in the specification that disclose that, or that perform that function.

THE COURT: Yes. But --

MR. DORNY: And it's only --

THE COURT: -- what structure is defined in this patent?

MR. DORNY: There is, our position is there is no structure --

THE COURT: Well --

MR. DORNY: -- that discloses that. And therefore --

THE COURT: And therefore what?

MR. DORNY: And --

THE COURT: Because I think I'm with you.

MR. DORNY: And, therefore, the position is that the patent will be held invalid.

THE COURT: Oh.

MR. DORNY: Because there is no structure. If, if there's -- the Federal Circuit's been clear that there's a quid pro quo that you have to disclose the structure, and if you fail to do that the claim becomes invalid. And I'm not asking the Court to invalidate today. I anticipate that we will file a summary judgment motion in this case. But if there is no structure disclosed for performing the function of ceiling-mounting then the claim itself becomes invalid.

THE COURT: Well, your candor is helpful.

And so let me turn to Genlyte. I don't see a structure here in the patent. Why should, why should I be construing something today? I'm just going to stick with construing.

Go ahead.

MR. HIGGINS: The reference in the claim refers back to text in the specification of the patent, your Honor. And if I can refer your Honor to the patent itself.

Do you have a copy of that in front of you, sir?

THE COURT: I do. Let me see. The whole patent. Yes. Just a second. No, I should have the whole patent. Hand up a copy if you would. I have it here somewhere.

MR. HIGGINS: Again, I have highlighting on it and this, I'll be referring to the highlighting.

THE COURT: No, I may have it. I have it. Just one second.

(Whereupon the Court and the Clerk conferred.)

THE COURT: I have it. Thank you. Yes.

MR. HIGGINS: I refer the Court to column 3 --

THE COURT: I have it.

MR. HIGGINS: -- of the patent, beginning at line 9.

THE COURT: All right.

MR. HIGGINS: An important feature of the present invention resides in the orientation of the lamps within lighting fixture which permits the lighting fixture to be packaged in a two foot by four foot configuration and thereby replace a conventional troffer.

Now, this courtroom does not have troffer lighting but a lot of commercial buildings in the United States do. And the term "conventional troffer" is well-known in the lighting industry. It's a term that has been in use for over 50 years.

If I could refer the Court to the materials that I handed up, and looking at slide 29.

THE COURT: Thank you.

MR. HIGGINS: What you see there is a typical ceiling grid system in a commercial building. The circle, the red circle on slide 29 depicts the ceiling grid system on which a conventional troffer will sit. And the structure of that is shown in the grid system that's in the center,

the very center of the slide.

THE COURT: But I guess I don't understand. You're replacing a troffer here.

MR. HIGGINS: I'm going to get to that, your Honor.

THE COURT: All right.

MR. HIGGINS: If you'll look at slide 31, this is how a conventional troffer is used and it's well-known. Mr. Lemons has discussed this in his declaration in support of the Markman proceeding.

THE COURT: He may, but what standing does that have? That's extrinsic. And moreover, I'm directed to look -- it's the patent that's supposed to teach. So, all we have here is, we say, well, now, we've got this swell thing and we'll ceiling-mount it and it can be in a two foot by four foot configuration thereby replace a conventional troffer.

Now, I agree with you, that is to be interpreted by one skilled in the art of lighting design. But that's your language? There's nothing else in this patent but that?

MR. HIGGINS: That is correct. However, I will make a couple of points about that.

First of all, I disagree with the Court that Mr. Lemons' information is extrinsic. I believe that the proper characterization of that is that Mr. Lemons' information helps the Court with its cognitive awareness of

what that term means to a person skilled in the art. It's not continuing any sort of investigation beyond the four corners of the patent. And --

THE COURT: Well, that's -- I hear you.

MR. HIGGINS: All right. And let me --

THE COURT: But that doesn't mean I accept that. So, let's go to that, though, since it's before me.

MR. HIGGINS: All right. Now, I'll continue, if you will, your Honor.

Slide 32 depicts how a conventional troffer is placed in a ceiling grid system, again information well-known in the art.

THE COURT: Yes. Which slide?

MR. HIGGINS: Thirty-two.

THE COURT: All right. So we now have how conventional troffers work.

MR. HIGGINS: That's correct, your Honor.

THE COURT: But this is going to replace it.

MR. HIGGINS: Yes, sir.

THE COURT: Because it's two by four.

MR. HIGGINS: That's correct. If you'll look then at slide 34.

THE COURT: I'm up to it.

MR. HIGGINS: This is Fig. 2 from the patent which states that it's a bottom plan view.

THE COURT: All right, now, I'm entitled to look at that. So this is the -- I see.

MR. HIGGINS: All right. And then if you'll look at Fig. 1.

THE COURT: Just --

MR. HIGGINS: Yes, sir.

THE COURT: No, no, let me -- you're -- this is helpful. Just so I understand here, these are these sort of light bulbs here, correct?

MR. HIGGINS: Yes.

THE COURT: Yes. Okay.

MR. HIGGINS: Those are depictions of what the people in the art call Compact Fluorescent Lamp, CFL.

THE COURT: Fine. Okay. So there's, there's Fig. 2.

MR. HIGGINS: Yes.

THE COURT: And that shows us, I think you're entitled to rely on that, that shows us what the replacement is supposed to look like.

MR. HIGGINS: Right. And if you'll look at Fig. 1 of the patent, your Honor.

THE COURT: Right.

MR. HIGGINS: You'll see that the inventive structure is in the ceiling.

THE COURT: Yes.

MR. HIGGINS: All right? Now, if you'll see, if you'll go to Fig. -- excuse me, slide 35 of the handup materials.

THE COURT: Yes.

MR. HIGGINS: What I have done here is, is taken Fig. 2 of the patent and converted it to an isometric view.

THE COURT: All right.

MR. HIGGINS: And then if you'll look at slide 36 you'll see how that isometric view of Fig. 2 fits within the conventional ceiling grid system. And finishing Fig. 37, or, excuse me, slide 37 shows how Fig. 2 of the patent is and now has wholly replaced the conventional troffer.

Now, I submit to you that this is information that is well-known to a person skilled in the art. We don't have to teach a person how to do that. And I would refer the Court to the Atmel case in our brief.

THE COURT: But let's just see here. Let me interrupt and see if the procedural context is not, if we can't sharpen the procedural context.

You propose a interpretation, covers a flange and/or mounting holes and equivalents thereof. I don't follow that at all. That's not what you teach here. You say this, this lighting system can be set up in a two by four -- let's start with the patent specifications because you're certainly entitled to rely on that.

So, we look here at column 3, line 9. An important feature -- starting at -- yes. An important feature of the present invention resides in the orientation of the lamps within the lighting 1. And what does that 1 refer to?

MR. HIGGINS: That's a misprint, your Honor; it should be light fixture 10.

THE COURT: Well, it's a misprint. There it is. Within the lighting 10 fixture which permits the lighting fixture 10 -- oh, and that's, that's a reference of course to the Figure 2 and Figure 1. Figures 1 and 2.

MR. HIGGINS: Correct.

THE COURT: Okay. All right. Which permits the lighting fixture 10 to be packaged in a two foot by four foot configuration and thereby replace a conventional troffer. All right. And then you've got figures that show that.

Now, what do I -- this is just a Markman. What do I have to construe? We see it. We see it stuck there in the wall. In the ceiling, not the wall.

Isn't the way to address this, let him file his motion for summary judgment on those grounds, and that's the time to have the argument. I just don't see I have anything to construe, and I'm not likely, unless I hear something else, to supply this language when you haven't supplied it. That, that gives you a leg up on the motion for summary

judgment. You've got two figures and a reference to replacing a conventional troffer, which I imagine people do understand what a conventional troffer is.

Let me, let me turn to the defense here.

MR. HIGGINS: Very well.

THE COURT: And don't get your hopes up but let's talk about procedure.

Don't you agree that's the best way to focus the issue so I can make a determinative ruling?

MR. DORNY: Defense has no issue with you postponing any interpretation of this until a summary judgment motion is filed.

THE COURT: But I've prepared for this and I'm, and you --

MR. DORNY: Right.

THE COURT: -- both sides were good in narrowing, very helpfully, the claims to be construed. I came on the bench, having prepared, thinking I couldn't construe this claim, candidly, without appreciating the result, if result it is. Counsel has aided me on that. I still, I still am very wary, skeptical, hostile, to importing the language that Genlyte would want, because I don't see it anywhere here. That's not the same thing as saying, as agreeing with your therefore. You'll get your chance on that.

MR. DORNY: I understand that, your Honor.

THE COURT: Let me probe this way. You do agree -- put Lemons to one side for a moment. Let me try out some propositions and see if you agree with them.

You agree that the term conventional troffer has a meaning to one skilled in the art at the time of this patent application.

MR. DORNY: Yes, your Honor.

THE COURT: All right. You agree that they are entitled to flesh out -- no dispute between you as to what the function is -- to flesh out the means by reference, this reference in the specification.

MR. DORNY: I believe, your Honor, that the conventional troffer does not refer to any structure for mounting the body but refers to the body itself. A troffer is a recessed lighting unit. That means it's the body. And that there is no structure disclosed for ceiling-mounting that body. As a matter of fact, there's multiple structures that someone could use.

THE COURT: You're making your argument and I understand it, but I don't think that's the question I asked. My question's inartful.

You agree that they are entitled to rely on this language in the specification, whatever it means.

MR. DORNY: Correct, your Honor.

THE COURT: Likewise, they are entitled to rely

upon both Figures 1 and 2, whatever they show.

MR. DORNY: Yes, your Honor.

THE COURT: Okay. Then I think for our purposes this morning that I should not go any further and I should wrestle with this issue if you file a motion for summary judgment on that ground. I'm not disposed to construe anything. I don't see that I have to construe anything. I'm rejecting their proposal because it adds in holes and flanges and different things, which I don't see disclosed here. But don't think that the therefore automatically follows.

Now, you understand that?

MR. DORNY: I understand that, your Honor.

THE COURT: And you're content with that?

MR. DORNY: Yes, your Honor.

THE COURT: For now.

Now back to Genlyte. What's wrong with that in the context of a Markman hearing? I now see and appreciate many of your slides here. I continue to think Mr. Lemons is extrinsic. Though I like the way you phrased that. But, your job is to teach how to do this to one skilled in the art in the patent. And you say we've done it. Well, maybe. We'll see that on summary judgment, with a careful perusal of the cases which both support and reject it.

But what's to be construed here?

MR. HIGGINS: I agree with the Court that our job is to teach people skilled in the art about the invention. This particular aspect of the invention does not need to be taught to people skilled in the art because it's been known and used for over 50 years.

I refer the Court to our brief, and the case, particularly the Atmel case. And I quote -- this is by the way on slide 23. I do not believe it is necessary to list in detail structure that is well-known. And there is a quote from the Atmel case: The specification of a patent would be enormous and unnecessary of length.

THE COURT: Yes, you've given me this. I can read it.

MR. HIGGINS: Very well.

THE COURT: And I am.

MR. HIGGINS: And then if you'll look at the bottom.

THE COURT: But perhaps I am approaching my job this morning too narrowly, but to me it makes sense. What is it that you want me to say? You proposed some language. Why should I adopt that language? Maybe that's the way to get at it.

MR. HIGGINS: All right, sir. If I can refer you back to slide 29.

THE COURT: Yes.

MR. HIGGINS: You say where is the flange that is shown, or where is it shown in the patent? Slide 29 discloses, or, excuse me, depicts the well-known ceiling grid structure. You'll see that it has a flange there. Fig. 2 of the patent fits right on that flange. The body of the invention fits right on that flange. That's what a conventional troffer does. And people skilled in the art know that. It is not necessary for this patent to teach people how to do something that they've been doing for 50 years. The key to this patent is that there are multiple light fixtures in a single integrated body that is ceiling-mounted. That revolutionized the hospital lighting industry.

THE COURT: But in a -- I hear you. Here's my problem. Just as it is error for a district judge to read into a claim a limitation that does not appear in the claim, so, too, it seems to me as part of a Markman hearing which deals with claim interpretation, it would be error to supply language that is determined only by those skilled in the art. You may well be right that since all of this is known and is used the patent survives a challenge that it fails to teach the structure in a means-plus-function claim. But those, it seems to me, are matters of fact, not rulings of law. So I prefer, especially since somebody wants a jury here, I prefer to deal with them on a motion for summary

judgment. The very language you cite here, when you give me some cases, talk about proof by clear and convincing evidence, must be shown by clear and convincing evidence. Well, that's the stuff and substance of trials. That's not claim interpretation. Markman, at least as the Federal Circuit construes it, and I'm bound by their construction, makes what we do this morning solely rulings of law.

Why shouldn't I confront this issue, an interesting issue, first to see whether things are so clear as matter of fact that there can be only one outcome, and in the motion for summary judgment of course we're going to look at what Lemons has to say. Of course we're going to see what he says one skilled in the art. But why should I under the guise of a Markman ruling of law start putting in language that isn't found anywhere in the patent. Or doesn't follow naturally save as it may be construed by one skilled in the art from the language in the patent. You've got two figures. You've got this language. You say this is all obvious. You may well be right. But I would be more comfortable dealing with it on summary judgment.

MR. HIGGINS: I don't have a problem with the Court dealing with it on summary judgment.

THE COURT: All right, fine. I think, then I think we've done all we came to do this morning, and I find this very helpful.

MR. HIGGINS: I will say one more thing, if I may, your Honor.

THE COURT: Please.

MR. HIGGINS: And that is that in a 112/6 issue as you have before you, it is, it is almost necessary to conflate the Markman and the validity issues. Because for the Court to decide whether or not the patent is invalid, and that's a clear and convincing evidence standard --

THE COURT: Well, the Court isn't going to do that. The jury's going to do that.

MR. HIGGINS: Well, Mr. Dorny in his summary judgment, he's going to try to persuade you, I'm sure, that it's clear and convincing evidence. And so on the summary judgment you have to decide whether there are issues of fact, and I believe that you already see that there are with respect to what that language discloses to --

THE COURT: No, no, I don't see that there are issues of fact. I see that there are factual matters.

I've written about -- have you read -- not that I'm the sole word on patents. But to me this is a very significant issue about which I've written in a case called Mediacom v. Rates Technology.

MR. HIGGINS: I have read Mediacom, your Honor.

THE COURT: Okay. Well then -- and I appreciate that. Thank you. Because I'm only a district judge. So,

if you've read it --

MR. HIGGINS: You're my district judge.

THE COURT: But I'm the district judge here, so here you are.

You see I try to draw the line. And I'm trying as faithfully as I know how to work fairly and accurately within the legal framework that I'm dealt by the Supreme Court and the Federal Circuit. So, I don't want to conflate the two. I've, what I've done this morning is straight rulings of law. If they want to review those de novo, fine. Because they should. These are rulings of law. And candidly, as far as I've gone, there's no real dispute.

Now, on this one, that at best is a mixed question of law and fact. I'm going to confront that on a motion for summary judgment and everyone can be very sure I will bend over backwards to leave matters to an American jury.

That's the teaching of Mediacom. It also is the requirement of the United States Constitution. I have chided the Federal Circuit for not giving a jury the range of authority that it would appear from the Supreme Court precedent is its due.

So, I'm expressing no opinion on how the summary judgment comes out. But that's the -- then of course I'm reading Lemons. I'm reading Lemons very carefully. I'll take Lemons flat out, if that's your position, as agreed.

But he'll say as matter of law looking at this language not good enough. I imagine. Well, I've been in that area before. I'll make a determination. It's just I'm not going to give you as matter of law language that goes beyond what the patent drafter drafted. That's legal error, I think.

MR. HIGGINS: I don't disagree with that in general. I do think that there is a point as discussed in these Atmel quotations that are from the Federal Circuit and particularly the one that says all one needs to do in order to obtain the benefit -- I'm reading from the bottom of slide 23 -- of that claiming structure -- and they're referring to 112/6 there -- is recite some structure corresponding to the means in the specification.

Under our case law, and now this is from the Baker Hughes case, interpreting Section 112/6, knowledge of one skilled in the art can be called upon to flesh out a particular structural reference for the purpose of meeting the statutory requirement of definiteness.

THE COURT: Yes. Well, that's, that's -- I note that that's an unpublished case.

MR. HIGGINS: That one is, your Honor.

THE COURT: Yes. And do you think that's controlling or simply persuasive?

MR. HIGGINS: I think that the reasoning of that case is helpful here.

THE COURT: That's not an answer, but yes, it is. And it is helpful, and indeed I think that's an accurate statement of the law.

This discussion is very helpful to me. But I think having circled around, I rest -- and it's not from an unwillingness to do my duty and do it promptly. I'm not doing this as part of Markman. The way, the way to confront these issues is on a well-pleaded motion for summary judgment, and I'll, I'll construct it.

MR. HIGGINS: Very well, your Honor.

THE COURT: All right. There's no other scheduling we have to do today, and I'm not requiring any motions by any particular time. But you've given me a heads up and I won't forget. This is all very helpful.

MR. HIGGINS: Thank you, your Honor.

THE COURT: Thank you all very much.

MR. DORNY: Thank you, your Honor.

THE COURT: We'll recess.

THE CLERK: All rise. Court is in recess.

(Whereupon the matter concluded.)

C E R T I F I C A T E

I, Donald E. Womack, Official Court Reporter for the United States District Court for the District of Massachusetts, do hereby certify that the foregoing pages are a true and accurate transcription of my shorthand notes taken in the aforementioned matter to the best of my skill and ability.

DONALD E. WOMACK
Official Court Reporter
P.O. Box 51062
Boston, Massachusetts 02205-1062
womack@megatran.com